COMPUTERWORLD

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NEWSPAPER

NEWS IN BRIEF

Were Wages Hiked By Index Data Error?

By Patrick Ward
Of the CW Staff

WASHINGTON, D.C. – Observers of the Federal Government's Cost-of-Living Index are wondering if a "data collection error" perpetuated over a seven-month stretch last year will cause employers who base their workers' paychecks on the index to try to retroactively collect the extra wages they had paid.

The error occurred in the used car component of the indexes for April through October. It was not discovered until November after it boosted the cost-of-living readings for the months involved by 0.1 to 0.3 index points.

The highest figure it reached night represent a penny an hour on a worker's paycheck, provided his firm made a cost-of-living adjustment during that period.

The Bureau of Labor Statistics (BLS) computes the index on an IBM 7074 using a data base of 150,000 price quotations and other, related information, according to John Layng, a BLS assistant commissioner for prices and living conditions.

He described the process as "computerization of a clerical operation."

The error developed "from a change in reporting that was not picked up by the two teams of [human] editors who go over the data before and after it is keypunched," he said.

When the editors did discover the error

(Continued on Page 2)

IBM Antitrust Trial Delayed Again

NEW YORK – Because of a lack of preparation on many of the details in the government's case against IBM, it appears the trial may now he delayed for as much as two to three months.

The government's attorney, Raymond Carlson, admitted last week the government had "clearly" underestimated the time it would take to prepare its side of the case.

Besides the delay already caused by a document mix-up [CW, Feb. 12] on the part of the government, Carlson also estimated it would take an additional eight weeks to prepare some other aspects of the trial.

"We can't prolong the starting date of the trial indefinitely," Judge David N. Edelstein said, although he did not set a date for the trial.

One Good Thing Leads to Another

By Don Leavitt
Of the CW Staff

"Try it, you'll like it" applies to software packages as well as to ... whatever the original pitch was for, according to a recent *Computerworld* survey of package users. Once an installation has acquired one package, it is likely to get others.

Utility and system software continues to be of more interest than application packages, although "we'll look at any program that would help either the DP operation of our end users" is a common and sincere attitude.

Conducted earlier this month, the survey confirmed the existence of common approaches to the acquisition process and changes in approach as time passes.

Evaluation procedures, for example, tend to become more orderly with experience. And loyalty to vendors is beginning to show up in software just as it had some time ago in hardware.

(When Datapro saw the same development in its survey last summer, Mary Lou Roberts, then-software editor, noted, "the large software houses with several packages to market can in some instances sell their reputations rather than their products.")

Few of the sites contacted by CW had completely formalized evaluation/selection procedures. They tend to react to problems that have arisen, rather than to plan ahead in hopes of avoiding them.

With surprising consistency, the users want to see the product they are considering in action – in their own environments – before they buy. Trial periods are very important to most of the users CW contacted.

Interest in packages from independent sources apparently may grow in direct ratio to a user's experience with IBM software. Several users rapped the giant of the industry for

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★ CW Special Report on Packaged Performance Follows Page 30 ★

Across the Country

Legislators Ready Price-Marking Bills

By Patrick Ward
Of the CW Staff

WASHINGTON, D.C. – It increasingly looks like legislators across the country will require supermarkets with scanning equipment to stamp prices on items already marked with the Universal Product Code (UPC).

Rep. Harold Ford (D-Tenn.) has introduced a bill into Congress with that aim, and State Sen. John J. Santucci (D-Queens) has introduced a similar bill into the New York State Legislature.

In California, state Assemblywoman Leona Egeland (D-San Jose) has proposed legislation requiring "dollars and cents" pricing on products marked with the UPC.

The Maryland Legislature is already considering such a bill and, in San Francisco, the president of that city's board of supervisors has proposed a city ordinance to require price marking.

Virginia legislators, however, killed a proposed price-marking law in committee because the lawmakers did not feel auto-

mated checkout stores "had been given a chance," said Lin Quitmeyer, administrative assistant in the Fairfax County Department of Consumer Affairs.

The legislators weren't convinced the law's proponents had enough survey data to show consumers would not welcome automated checkout supermarkets that don't mark prices, she said.

Rep. Ford's congressional bill (H.R. 3126) would amend the Fair Packaging and Labeling Act to require packaged consumer commodities be labeled to show their selling price, said Ilona Nickels, legislative assistant to Rep. Ford.

Calling clearly marked prices "a non-negotiable right of all consumers," Nickels said the extra cost a supermarket with point-of-sale (POS) equipment faces in marking prices on items is not too much to pay.

Nickels said the Retail Clerks International Association supports the Ford bill. The congressman's staff will be meeting with several consumer groups also, she added.

Assemblywoman Egeland, who is sponsoring the California bill, noted supermarkets say they will benefit from electronic scanning of items at checkout counters.

(Continued on Page 6)

Digital Systems Interface Links RS-232 Units, IBM S/3 Model 10

By Vic Farmer
Of the CW Staff

FREDERICK, Md. – Not content with the way IBM has interfaced I/O devices to its System/3 Model 10, Digital Systems Corp., a systems and software house here, has designed and is selling a low-cost RS-232 interface.

Billed as Model 1 of the ISC Terminal Adapter, the unit is said to provide a means of utilizing any asynchronous RS-232 device – paper tape units, CRT terminals, tape cassettes, line printers, etc. – with the Model 10.

The adapter and necessary software rents for $600/yr or can be purchased for $1,985.

Included in the adapter's functions, according to the firm, is the option of reformatting input by means of field separator characters; code conversion from Ascii to Ebcdic; conversion from lower- to upper-case letters on input (thereby allowing the input to be either upper or lower case); linkage subroutines to allow RPG-II and Fortran access to the terminal; and the ability to overlap terminal functions with other computer activity.

I/O can be performed at speeds ranging from 110- to 1,200 bit/sec. Parity is checked on all input, and parity generation on output is a standard feature, the company said.

The adapter is linked to the most inexpensive method of getting into the Model 10 – through the 5471 printer-keyboard attachment adapter (IBM feature no. 4110) and the IBM Remote RPQ no. 841279, which can be rented together for about $65/mo from IBM.

$300/Mo Less Than BSCA

The ISC Adapter is said to save about $300/mo over the use of IBM's Binary

(Continued on Page 2)

Caravan Kicks Off in Atlanta

ATLANTA – "Business can no longer afford the luxury of a computer," Edward Bride, vice-president/editorial services of *Computerworld*, said in remarks prepared for delivery at the opening session of the Computer Caravan held here Monday.

Computer center managers should search for new applications that could have a positive impact on company revenues and a negative impact on overhead, Bride said.

"Just as any other expensive tool must be utilized fully, so it is with computers," he remarked.

Whether users "aspire to greater heights" in their companies or simply want to do a better job in their DP department, they should become concerned with "sales, cash flow, inventory control and general overhead. If [a user's] computer isn't helping in all of these functions," it is being underutilized, Bride added.

The opportunities are especially great for small system users, who might have originally justified procurement of a computer on the basis of two or three applications and 20- or 25 hr/week utilization.

"It is the responsibility of every manager to look outside his own shop and improve the impact his shop may be having on the entire operation," Bride also said.

The use of computers to cut the cost of administrative overhead was also the topic of the opening day luncheon talk, given by Ernie O'Neal, commissioner of Georgia's Department of Administrative

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FCC Nixes Bundled Satellite Services

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. — Any domestic satellite system in which IBM participates will be the only corporate entity in which IBM can sell or promote communications services, according to the Federal Communications Commission (FCC).

In issuing the full text of its restrictions on an IBM satellite venture (CW, Feb. 5), the FCC recognized this requirement was necessary to prevent IBM sales and marketing employees from directly or indirectly promoting satellite services as part of IBM "systems" or "bundled" customer offerings.

The commission also said the IBM Corp. and any corporation in which IBM has "a controlling or substantial interest" may not engage in the sale or promotion, directly or indirectly, of communications services on behalf of any satellite system in which IBM participates.

Any contracts made between IBM and the satellite corporation should be handled strictly "at arm's length" in a fair and reasonable manner with "no overreaching on the part of either party," the FCC said.

A satellite firm in which IBM participates "could not sell or promote IBM's communications systems and/or terminal equipment except to the extent it utilized such IBM equipment in its tariffed service offerings," the commission said.

Interconnection Arrangements

In order to provide for the interconnection of non-IBM customers, the FCC said the IBM satellite venture will have to provide "a detailed description of the "kinds of interconnection arrangements it will set forth for the interconnection of customer-provided communications systems and/or terminal equipment to its facilities and services."

A detailed description will also have to be provided on the types of interconnection available to other satellite carriers, or earth station licensees, the commission said.

Based on its earlier decision in the Computer Inquiry, an IBM satellite firm would be allowed to provide primarily communications services with incidental DP services. This type of hybrid service "would preclude a system in which IBM . . . offered 'packaged' data communications services."

The order stressed this view was based on existing policies resulting from the Computer Inquiry and does not preclude a reevaluation if public interest requires one.

After receiving the FCC order, IBM said it would seek clarification of certain portions within 30 days. Certain wording in the FCC order "gives us serious concern," the IBM spokesman said.

Future actions by IBM in the satellite area could be subject "to constant challenge" by the commission depending on the intent of the order, the spokesman said. In some instances the conditions prescribed by the FCC "appear to be unworkable," the IBM source concluded.

Error in Cost-of-Living Index May Have Hiked Workers' Wages

(Continued from Page 1)

in November, unions with cost-of-living contracts had to face the possibility that employers would want some money back.

'An Honest Error'

"Our research people were a little skeptical" about the BLS error announcement, a United Auto Workers (UAW) spokesman said.

"There have been indications in the past there could be some hanky-panky going on . . . that they were trying to politicize the index."

Union officials sought permission to discuss the error with BLS officials and came away convinced it was "an honest error."

No Retroactive Changes

UAW contracts bar any retroactive changes in cost-of-living adjustments, the spokesman said. And many other union contracts do not take into account a cost-of-living change smaller than 0.3, the highest boost the error caused, another union official observed.

The payments made in error "would cost much more to recoup than they were worth," he explained.

Working on Solution

However, the United Steelworkers and employers in the copper and aluminum industries are groups that are still discussing how to resolve the error, according to a Steelworkers spokesman.

BLS officials normally meet twice a year with both a Labor Relations Advisory Committee and a Business Relations Advisory Committee.

The unions are especially interested now in the BLS' plans to update and revise the index, a task which the bureau expects will be completed in two years.

IBM 3/10 Gets RS-232 Interface

(Continued from Page 1)

Synchronous Communications Adapter (BSCA), but the transmission rate of BSCA can be twice as fast.

The ISC can also serve as a substitute for the Multiple Line Terminal Adapter (MLTA) for the System/3 Model 10, although the ISC unit cannot, as yet, support a multiterminal operation. The company recommends the user install a concentrator, such as the Techtran 8400, for this type of operation.

In a single-device configuration, ISC claimed its adapter will save about $410/mo over the MLTA.

Easy Installation

Installation basically consists of unerating the adapter, plugging the terminals in to it and then plugging the terminals into the System/3.

Some of the software supplied with the adapter will allow RPG-II, through a special file description specification, to perform I/O; allow RPG-II to perform controlled reformatting under pattern control; allow Fortran programmers to read and write to the terminal through subroutine CALL statements; give the terminal the characteristics of a sophisticated calculator; and provide the ability to Escape or cancel the current job running on the computer through the terminal.

Maintenance is performed either through Sorbus or by air freight replacement. Digital Systems is at 10 W. College Terrace, 21701.

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Business Booming at State Unemployment DP Centers

By Nancy French
Of the CW Staff

While economic conditions have tended to slow activity in some DP installations, quite the reverse is true at state employment security DP centers around the country.

The Special Unemployment Assistance Law signed by President Ford, which gives benefits to people in job categories never covered before, has added a huge volume to weekly claims check processing. The 13-week federal extension of unemployment benefits is expected to swell unemployment rolls by 75,000 in Massachusetts alone.

In that state, where the number of people receiving unemployment benefits has reached 221,000 – compared with 55,000 last year at this time – William D. Coveney, manager of DP services, has had to add 64K of memory to one of his CPUs and increase his 20-position key-to-disk data entry system to its full 32-position capacity.

A new five-hour night shift of 10 data entry clerks has been added simply to enter new claims.

Since existing state law does not permit a change from weekly to biweekly payment of claims checks to reduce processing volume, the only way to keep up is by adding capacity, he said.

"We're holding out okay, but we worry from day to day if we're going to be able to keep going," Coveney chuckled.

The state's centralized check processing is done on a Univac 70/45 and a 70/2 with a Univac 590 disk storage system and "lots of new tape drives," Coveney said.

Near-Crisis Situation

In Tennessee, the increase in unemployment has placed the Employment Security Division's DP center in a near-crisis situation.

With new claims reaching 14,000 each week and the number of benefits checks issued weekly now averaging about 100,000, the center's workload has nearly doubled.

State managers are in the throes of deciding whether to solve the problem by contracting work to a service bureau or installing a second Univac Spectra 70/45 CPU, according to Jim Wells, manager of systems analysis.

"Normally we'd have to bid this out," Wells said, "but because this is an emergency situation, they're going to let us get another CPU of the same brand if that's what we decide is the best thing to do."

The Tennessee system is running 24 hours a day, seven days a week just to determine unemployment benefits and process claims checks, while jobs that aren't essential have been curtailed temporarily, according to Tony DeGeorge, chief of benefits.

When data entry needs outgrew the center's 40-position General Computer Systems key-to-disk system, a new 15-position system was added to keep up with the volume, Wells explained.

As for hiring, the new data entry slots have to be filled, but all other job categories will remain as-is, Wells said.

New Strategies

In Illinois, where 240,000 checks are processed and mailed on a biweekly basis and 5,000 to 6,000 new claims are filed daily, two new strategies have been implemented to minimize the impact.

First, two keypunch contractors have assumed the 6,000- to 8,000 card/day punching burden. Secondly, a new mail claims system, allowing claimants to file benefits claims by mail every two weeks rather than in person every single week, has cleared claims offices for new filers.

In transition from a decentralized to a centralized state system when the increase hit, Illinois was lucky, according to DP manager Charles Finch.

The new IBM 370/168 on-line system at the state capital in Springfield can handle the volume with no real problems, he said. And prepunched cards and keypunching minimized to bare bones have made data entry as rapid as possible.

'Swamped' Operation

In California, Dave McAfee, project manager for payment determination, described his operation as "swamped."

Most recipients get checks every two weeks, but in some claims offices people get cash, McAfee explained, "which, as you can guess, causes us a lot of trouble."

California's claims processing system, which dates back to 1958, is only partially computerized, McAfee said.

"We're installing a new payment system that will use a Control Data Corp. 916, and we've also just put out a bid on a new OCR system that will double our capacity, but it hasn't been awarded yet," he said.

McAfee noted the department is working its IBM 370/165 computer 24 hours a day, and programmers are working "lots of overtime," but as yet no new employees have been added.

The big problem is that with the same resources and number of employees "we haven't had time to redesign the programs," he said.

Jack Northrup, public relations spokesman for the data center in the state of New York, said adding a few new keypunch operators has enabled that state to cope with the number of claims that increased from 316,000 to 462,000 between Christmas and the end of January.

The runtime for the program that processes unemployment checks has increased to as much as two and one-half hours and check printing now takes five hours a week, he added.

Nothing else has been altered and nothing else is expected, Northrup said.

DP manager Alice Java refused comment on the situation.

Tunney Gets Ervin Job On Rights Committee

WASHINGTON, D.C. – Sen. John V. Tunney (D-Calif.) has been appointed chairman of the Senate Judiciary Committee's Subcommittee on Constitutional Rights, replacing former Sen. Sam Ervin (D-N.C.), who retired in December.

At the same time, Tunney's ad hoc Committee on Citizen Interests will be merged into the Constitutional Rights Subcommittee, placing responsibility for these activities under the jurisdiction of a single committee.

A member of the subcommittee for some years, Tunney has been associated with right-to-privacy advocates and recently cosponsored the Financial Privacy Act.

Tunney is well-known in the computer industry for sponsoring a law that gives the public the right to comment in anti-trust litigations before a final decision is issued.

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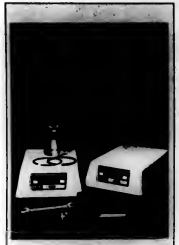

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Hearings Expected in March

House Gets Private Sector Privacy Bill

By Nancy French
Of the CW Staff

WASHINGTON, D.C. – The Comprehensive Right to Privacy Act has been introduced in the House of Representatives to bring to the private sector and state and local governments the privacy safeguards now guaranteed to personal information maintained by the Federal Government.

Assigned the title "H.R. 1984" by special request of its sponsors, Rep. Edward I. Koch (D-N.Y.) and Barry Goldwater Jr. (R-Calif.), the bill's general principles are being circulated in the private sector and among state and local government officials for comment.

The congressmen have sent a questionnaire, along with a copy of the Privacy Act of 1974, to businessmen, university and bank officials, insurance company executives, state governors and local government officials to elicit the nature and extent of the difficulties such a law would cause to their present operation.

Information gathered in the questionnaires will be used in hearings on the bill, which will be held sometime after March 15 by Rep. Don Edwards' (D-Calif.) Subcommittee on Civil Rights and Constitutional Rights.

Provisions

H.R. 1984 would permit any person to inspect his own file and to have copies made at reasonable cost to him, as well as permit him to supplement the information in his file.

The bill also would permit the individual to remove erroneous or irrelevant information and would require the organizations and persons to whom the information had been given be notified of its removal.

Further, the bill would prohibit the disclosure of information in the file to individuals or organizations other than those who need to examine the file in the performance of their duties.

It would also require organizations to maintain a record of all persons inspecting files of personal information, including their identity and purpose of inspection. Firms would also have to insure the information is maintained completely and with adequate security safeguards.

In addition, the bill would require, when information is collected from individuals, they be told whether the request is mandatory or voluntary and what the results of refusing to give the information would be.

Further, the bill would require employees handling personal information do so under a code of fair information practices, know the security procedures and be subject to penalties for any breaches.

Finally, organizations would be prohibited from requiring individuals to give their Social Security number for any purpose not related to their Social Security account or not mandated by federal law.

Questionnaires Mailed

Thousands of questionnaires have been mailed giving the private sector the opportunity to comment on whether it presently practices any of the 10 privacy principals outlined in the bill.

Organizations were asked to state whether cost, time or operational considerations would prohibit implementing any of the principles or whether administrative or legal problems would be involved in implementing any one of the principles.

Each organization polled was asked to list its number of employees, what types of personal records it maintains and whether the files are manual or computerized.

One Good Thing Leads to Another When Users Pick Their Packages

(Continued from Page 1)

programming logic that is "inefficient" and "developed quickly with the goal of selling hardware."

One user told the survey team, "Right now, we're trying to offset the handicaps of our marketing-oriented DOS."

Measurements Important

Another user noted "measuring software performance and increasing the utilization of our machine are both very important because we are going to [IBM's Time-Sharing Option (TSO) for OS] soon and want to be prepared."

The need to get into performance evaluation – often with independent software monitors – was, in fact, mentioned by every surveyed user that was moving toward TSO.

While few users had a highly structured package selection procedure, regardless of what kind of software was under study, most said they have a general routine that could be and is adapted to fit the evaluation of different types of packages.

Same General Pattern

Users who have several packages have developed evaluation systems that depend on more than one person. But no matter how many people are involved, the general pattern is the same.

Once a need is sensed – by note, request form, conference or overheard conversation – someone begins looking to see what is available.

The search starts with scanning of DP publications and directories and paying more attention to the direct-mail pieces from software vendors.

Talking to local friends and to users named by vendors provides insights into "real-life" use of packages that isn't covered in the sales literature or technical documentation, while review of that material gives clues as to the technical aspects.

A number of users have moved toward a matrix for evaluation, charting desired characteristics (weighted by the degree of desirability) against quality judgments. The top two or three products are brought in on trial.

Even after live preselection tests, users encountered problems after the packages were installed, they told CW. But the problems tended to be relatively small, and vendors generally were "right there to help."

'Doing Your Homework'

Users are becoming more self-sufficient; several stressed "doing your homework" ahead of time – really understanding what the package can and cannot do – to minimize problems.

Application packages especially payroll systems, are being used, but this general class of software was faulted in two curiously contradictory ways. Packages were considered either so general they were time-consuming to customize or insufficiently general and couldn't be applied to a specific situation.

In any case, there is some movement toward a split in responsibility for evaluating application software. Systems analysts and other DP technicians check out the file handling, timings and other internal workings, and personnel from the departments that expect to use the output review it and the logical processing steps that lead to it.

Better than half of the DP managers said they still have money available for package purchases, even with current economic conditions. Some had a separate budget item for such acquisitions; others favored, or at least worked with, an integrated DP budget that gave them freedom to use some of the funds for outside software.

Businesses' Systems a Luxury, Atlanta Caravan Attendees Told

(Continued from Page 1)

Services.

The Computer Caravan this year offers an expanded user program, more than 45 exhibitors and a series of special afternoon programs. The Caravan recently became a division of CW with the appointment of Avery Blake as president of the division.

Blake was formerly president of Qume Corp. and has also been associated with Iomec and Singer-Friden.

"The Caravan has become a bigger and and more complex operation over the years, and we felt it was time to give it special status as a division," CW Executive Vice-President Walter Boyd explained.

Special Programs

This year's Caravan will feature a variety of special programs including the three "open" afternoon sessions, a Canadian session in four cities and a schedule of prominent luncheon speakers.

In Philadelphia, Dean Donald C. Carroll of the University of Pennsylvania's Wharton School will address the luncheon audience on "Decision Sciences."

Other luncheon speakers include Jerry Hammett, deputy director of Ohio's Department of Administrative Services, who will speak in Cleveland on the impact of privacy laws on computer users, with emphasis on nongovernmental users.

Commissioner Richard L. Brubacher of Minnesota's Department of Administration will address the opening day luncheon in St. Paul. In addition, Daniel McGraw, state assistant commissioner, will be conducting one of the users forum workshops in that city.

Canadian Needs

Robert T. Horwood, president of the Canadian Information Processing Society (Cipe), and Bride have jointly announced a special Canadian session which will be conducted in Caravan cities easily accessible to Canadian users.

The program, to be held in Cleveland, Chicago, St. Paul and Seattle, will be oriented toward the unique problems and needs of Canadian DPers, according to Horwood.

Other "open" afternoon sessions, which will be held in all nine cities, include one on professional development coordinated by national professional societies, a session on virtual vs. real storage, and one chaired by members of the Computer Security Institute.

After Atlanta, the Computer Caravan will travel to Philadelphia, (March 4-6), Hartford (March 11-13), New York (March 18-20), Cleveland (April 1-3), Chicago (April 8-10), St. Paul (April 15-17), Seattle (April 20-May 1) and San Francisco (May 6-8).

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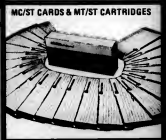

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'Experimental' Lack of Pricing Permanent, Md. Legislators Told

By Ronald A. Frank
Of the CW Staff

ANNAPOLIS, Md. – The first automated supermarket checkout systems are not experimental, but are actually planned operational systems.

This was one of the charges raised by consumer representatives at a public hearing held last week by the Maryland House of Delegates' Committee on Economic Matters to consider legislation that would require prices to be marked on all supermarket grocery items.

The pending legislation was triggered by the recent local opening of an automated Giant Food, Inc. supermarket which includes a laser-scanning checkout system, the 3660 from IBM. The store eliminated item pricing and almost immediately came under fire from local consumer groups.

Representatives of the supermarket industry said the initial automated store systems are experimental. Any premature attempt to legislate mandatory item pricing will adversely affect the results of the in-store tests, they told the state legislators.

The 24-member committee heard more than 15 witnesses with about half favoring the four proposed pricing measures.

"It is much tougher for the shopper to spot rising prices if the computer has the last word. The store manager could change prices without the consumer knowing about it," explained John Ward, state delegate from Montgomery County, who sponsored one of the proposed pricing bills.

"Giant is basically going to hide or make it very hard for consumers to know the price of an item until the very last minute at the checkout," said Charles Docter, also a delegate from Montgomery County and a sponsor of one of the pending bills.

Appearing in defense of the nonpricing concepts was Joseph Danzansky, president of Giant Food. "In today's economic climate, we felt we had to learn whether really substantial savings were possible through alternate systems of price identification, good shelf marking and a detailed register receipt tape, and whether these alternate systems would be acceptable to consumers," Danzansky said.

"To deny ourselves the opportunity to make this test would be counter to the public interest," he told the committee.

"This is no longer a test store because Giant has begun to advertise the benefits of the system," a representative from the Consumer Affairs Office of Anne Arundel County said.

The IBM system at Giant is not foolproof and a customer has already been charged the wrong amount for an unpriced can of string beans, the county consumer representative said.

The store started advertising only after consumer groups began to demonstrate against the absence of prices.

Noting the in-store system is not "locked in concrete," Danzansky asked the committee for "six more months to get the answers to the many unknowns."

If the proposed legislation is passed and takes effect on July 1, Giant could continue its testing with prices on products after that date, suggested Frank Robey, a representative from Baltimore and a sponsor of one of the bills.

The proposed legislation provides a "rare opportunity and challenge to see that technology advances with adequate consumer protection," Ellen Haas of the Maryland Citizens Consumer Council told the committee.

Lawmakers Ready Price-Marking Bills

(Continued from Page 1)

"There are just some things we cannot sacrifice for efficiency, and one of them is our absolute right to know what we are paying for the items we purchase," she said.

In San Francisco, the board of supervisors' president, Dianne Feinstein, and Supervisor Robert Mendolsohn have requested drafting of a price-marking ordinance that would apply to all items sold in retail stores, according to Joan Lubamersky, Mendolsohn's administrative assistant.

The largest consumer group in the nation, the Consumer Federation of America (CFA), has taken a stand against an end to price stamping in stores equipped with automated checkout systems, said Information Director Midge Shubow.

Consumer groups are exchanging information with the retail clerk's union in their common effort to retain price marking, she added.

The Store That Inspired the Bill

By a CW Staff Writer

SEVERNA PARK, Md. – The supermarket that stopped price marking and inspired pricing legislation is the new Giant store at the Severna Park Mall.

The checkout section includes 10 laser-scanning aisles which a store official said cost $150,000. There is also a demonstration scanner where shoppers can see how the Universal Product Code (UPC) symbols are scanned.

On entering the store, shoppers pass a projector that presents a continuous five-minute series of slides explaining the IBM checkout system, the UPC code and the benefits for consumers.

Prices can't be changed in the store, without the knowledge of the company's central site DP center in Landover, according to Frank Barrilla, general manager of the store.

Each night the central site IBM 370 prints out new end-of-shelf prices changed during the previous day. The price file in the store controller is updated on-line from the DP center over private lines.

The next morning the new labels and a printout of the current prices are delivered to the store. Barilla is responsible for having the new labels applied to the shelves.

This is the first order of priority and, if not done correctly, the shelf prices will differ with the prices in the controller.

During the day Barilla can get sales totals as needed at his manager's station. Reports on item movement, sales by checkout clerk and peak period totals are regularly printed out. This data is also transmitted to the 370 when it polls the store controller.

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N.C. School Board Ignores System's Integration Plans

By Edith Holmes
Of the CW Staff

DURHAM, N.C. – Several computer plans created by researchers here demonstrate school zoning changes for increased integration can be made without massive busing.

But faced with a school population that is only 26% white, the city school board couldn't decide between proposals ranging from a strict mathematical assignment of students without regard to race to a plan requiring a 15% to 25% white population in each school, according to Philip C. Cooley, a researcher with the Research Triangle Institute and the architect of the proposals presented to the board.

He explained the essential question before the board boils down to: "Should we draw attendance zones that will attract whites back into the system, or should we come up with an integrated system that will please the courts but might possibly increase the flight of whites from the schools?"

Reaching a stalemate in debate on this problem, the board submitted its current busing plan to U.S. Middle District Court Judge Eugene A. Gordon by its Jan. 15 deadline. That plan called for breaking up neighborhoods in Durham and then pairing schools to achieve some racial mix.

Cooley noted, however, that out of this pairing one school tends to be all black and the other to have the largest percentage of white students possible.

And, despite the range of choices open to the board as a result of manipulating "a classical transportation algorithm" both in the computer and manually, Cooley anticipates many more lengthy discussions before any compromise is achieved.

ACM Algorithm

Using an algorithm from the Association of Computing Machinery's (ACM) 1971 *Communications of the ACM* collection, Cooley described his procedure as the approach to a typical operations research problem: "Assign all the pupils in a school system to the nearest available school, such that the capacity of the school is not exceeded and the numbers of white and black students achieve a certain mix."

Cooley ran the algorithm, developed in Algol, on an IBM 370/165 using the Time-Sharing Option at the Triangle Universities Computation Center. By juggling the several variables involved, Cooley developed nine plans for the elementary schools and 10 plans for the junior high schools.

In each case, the algorithm was used as a guide tool to which different sets of boundary, capacity and racial constraints were added.

Chief Parameter

Where preserving the neighborhood is the most important criterion in assigning children to schools, "distance as the crow flies" becomes the chief parameter, Cooley said. But because the algorithm demands a racial balance as well, white students would have to be bused to the south sections of Durham, and black students would have to travel to schools in the northern parts of the city, he added.

Cooley noted, however, that the school board soon made it clear it would not tolerate nonconterminous zones. "Consequently, the need for each school's district to be made up of zones that share boundaries became a constraint that had to be incorporated manually once the algorithm was run," he said.

Additional constraints eventually led Cooley to develop "a very elaborate bookkeeping and calculating system for generating solutions." Given the stipulations of the board, he commented that "in most cases, I was not looking for optimum solutions to the problem."

Working between Dec. 17, when he received the contract to develop the plans for the board, and Jan. 10, when he made his final presentation to the school officials, Cooley noted he was soon able to turn a new plan around in a day.

Split Down the Middle

Despite his efforts, however, the six-person school board was split down the middle. One side supported the strict mathematical assignment of pupils, and the other side favored requiring a 15% to 25% white population, according to Cooley.

"With a deadline for filing its proposal with the court by Jan. 15, there was no time to work at a compromise," he said.

The district court requested the city school board file a proposal for redistricting following a hearing last May on the National Association for the Advancement of Colored People (NAACP) Legal Defense Fund's desegregation suit directed chiefly against the Durham County Board of Education.

The suit unsuccessfully sought to merge the city and county school districts or to extend the city district to the city government boundary. Cooley noted that 78% of the students in the county schools are white.

At this point, the decision of Gordon issued in July is being appealed, but the NAACP is no longer seeking to force a merger.

In his ruling, however, Gordon observed that the computer-generated plans prepared for the NAACP Legal Defense Fund by area consultants Joan Troy and Jane Stein established that major changes in and between school districts to further integration were feasible.

Cooley and the Research Triangle Institute were contracted to prepare similar plans for the city school board.

Gordon is currently considering the board's Jan. 15 proposal, and Durham is awaiting his answer.

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Police Error Makes Felon's Flight Easy

MEMPHIS, Tenn. – When police officers here entered a wrong birth date into their statewide computerized justice system, they unconsciously helped a criminal escape from prison for the second time in a year.

Charles Henry Humes, convicted of assault with intent to commit first-degree murder, was sentenced to three years at the Shelby County Penal Farm, a light-security facility, on Dec. 15.

After he escaped from Shelby last Christmas Day, it was discovered he was wanted for escaping from Ft. Pillow State Prison, a maximum security facility, where he had been serving a 25-year sentence for armed robbery.

At the time of Hume's arrest for the more recent crime, police explained, the wrong birth date was entered into their system and no other charges against Hume were found.

Meanwhile, Hume is still at large.

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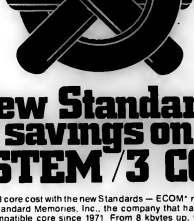

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By Charting Ups and Downs

Airline's Biorhythm Monitoring May Turn Theory Into Job Safety

By Nancy French
Of the CW Staff

SAN FRANCISCO – A major airline is using a computer to test the theory that people's daily emotional and physical ups and downs can seriously affect the way they perform their jobs.

United Air Lines' San Francisco aircraft maintenance base is monitoring the biorhythms of more than 28,000 maintenance employees on an IBM 360 as a means of reducing the number of on-the-job accidents.

According to the biorhythm theory, the human body's physical, emotional and intellectual ups and downs can be plotted in fixed, repetitive cycles or sine waves, beginning from the date of birth.

Theoretically, the physical cycle repeats every 23 days; the emotional, every 28 days; and the intellectual, every 33 days.

Statistics indicate individuals seem to have more accidents on days when their biorhythms are on a negative curve or are crossing the neutral, or zero, mark on the sine wave.

United's safety records show an employee can counteract the effect of a negative biorhythm for a given day by simply taking extra precautions, said Vern Parker, manager for industrial engineering.

United ground crews at National Airport in Washington, D.C. charted since Novemeber 1973, cut accidents in half over a one-year period simply by discussing safety with their supervisors on critical days, Parker said.

Pilots and other United employees have not as yet been included in the biorhythm study.

United is attempting to duplicate a Japanese bus company's recent program which combined biorhythms with industrial safety to reduce drivers' accidents, according to Parker.

Program Support

The computer programs that support the safety campaign are small, taking about 60K of memory, and processing is done about three or four times a week during the third shift, according to Bill Banfield of the DP staff.

Two-month cycle charts are prepared for each employee using a small Fortran program. Fortran was chosen because plotting the sine waves took too many calculations for Cobol, Banfield said.

A second program produces a summary chart for each foreman, giving the name and date of an employee who will have a "zero," "double-zero" or "triple-zero" day.

The sine wave algorithm was originally developed on an IBM 1130 and later modified for the 360.

Biorhythms and Safety

The relationship between biorhythms and on-the-job safety has many proponents, among them Douglas Neil, a psychology professor at the Monterey (Calif.) Naval Postgraduate School.

In a paper entitled "Biorhythms and Industrial Safety," Neil said when the cycle is crossing the zero line performance potential is considered highly unstable.

"A double critical day, or a double negative day (when two cycles are changing phase or in the downphase), or a triple negative day (when all three physical, emotional and intellectual cycles are negative) might signal a particularly accident-prone time."

The theory makes no allowance for external factors such as weather, equipment malfunctions, errors of judgment by others or phenomena such as earthquakes, Neil pointed out.

Neil thinks biorhythms may someday gain the same wide acceptance the circadian rhythms now have. (Circadian rhythms are the day/night cycles resulting from the earth's rotation which cause persons who cross enough time zones to experience "jet lag.")

Bernard Gittleson of the Time Pattern Research institute in West Caldwell, N.J. claimed charts prepared after the TWA jetliner crash in the Virginia Blue Ridge Mountains last year show both pilots were in critical biorhythm phases.

Originated in Europe

The biorhythm theory originated in Europe around the turn of the century and was revived in this country by the 1964 publication of a book entitled *Is This Your Day*?

Physical and emotional cycles were discovered in the late 1800s by Herman Swoboda, a University of Vienna psychologist, and Wilhelm Fleiss, a Berlin physician, working separately.

Not until the late 1920s was the 33-day intellectual cycle charted by an Austrian engineering professor, Alfred Teltscher, after he observed the variation in performance of his students.

Unlike astrological charts, which are thought to be in a constant state of flux and vary according to birth location, biorhythms are believed to begin at birth and run concurrently and periodically throughout a person's life.

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At Harvard, University of Pennsylvania

Two Schools Planning Programs to Boost Business DP

By Edith Holmes
Of the CW Staff

Two major universities have developed programs in information systems in an effort to close the gap between the needs of business DP and the courses traditionally provided by computer science departments.

Beginning next fall, Harvard University will offer a Master of Information Sciences (MIS) program leading to a Master of Engineering degree.

And, employing a different approach to achieve similar ends, the University of Pennsylvania's Wharton School has created the Department of Decision Sciences, designed to provide undergraduates, Masters in Business Administration (MBA) and Ph.D. candidates in decision sciences with courses in information systems and quantitative decision making.

With its program, Harvard recognizes "the typical graduate of a master's program in business administration lacks the technical depth needed to guide the development of advanced computer systems, while those trained in Ph.D. programs in computer science are often too technically specialized" to appreciate either the overall operation of organizations or the full effects of DP decisions on these organizations, a university spokesman said.

Similarly, the Wharton School is concerned its students receive "thorough training in computer applications for the solution of management problems" and that they solve realistic problems and implement solutions "by whatever means appropriate," a University of Pennsylvania representative emphasized.

Summer Internship

Designed to provide both technical and managerial instruction, the MIS program at Harvard will involve two years of course work, a summer internship in industry or government and a project tackling a significant problem of a company or institution, the spokesman said.

Basic courses in areas such as programming language design, the development of operating systems, advances in hardware design and computer architecture and the issues involved in developing complex information systems and data bases will be taught by computer science professors, most of whom have had full- or part-time experience in industry.

In addition, people working in industry will give seminars exposing students to real problems throughout the two-year program, Judy Townly, professor of applied mathematics and one architect of the program, added.

Basic Management Skills

About one-third of the program will introduce students to basic management skills. These courses will be taught by professors from the Harvard Business School and from the Sloan School at the Massachusetts Institute of Technology, she noted.

"Potential candidates for the MIS program would typically have worked with computers, perhaps as a manager for a DP center, as a financial analyst for a bank or as a DP specialist for a corporation or government agency," the spokesman said.

"We will pay close attention to the varied backgrounds and career goals of our students in determining which courses each should take," Townly added.

At the Wharton School, graduate and undergraduate courses will focus specifically on computer-aided decision making as "a practical and essential part of management and a tool for the chief executive officer as well as the operating management to depend on," that university's spokesman explained.

Students enrolled in the Department of Decision Sciences will study the design and operation of systems for collecting, transmitting, storing, retrieving, processing and displaying information.

They will then move on to courses on decision making that use information for planning and control of operations in business, government and not-for-profit institutions, he noted.

Wharton's courses should provide students not only with a knowledge of the strengths and limitations of computer-based decision support systems, but with an understanding of how to manage the development of advanced systems, the representative commented.

Stressing the program in decision sciences is not strictly quantitative, he added students will cover the management of large projects; such management functions as accounting, manufacturing, financing, purchasing, inventory and marketing; and customer satisfaction, personnel relations and organizational and behavioral requirements.

As in the Harvard program, the faculty of the Decision Sciences Department will be "operationally oriented" — the majority will be former consultants or full-time employees in industrial or governmental DP.

Undergraduates in the department will be offered a major including work in both information systems and quantitative decision making. MBA students will be able to acquire a major in operations management with a program in information sciences.

Finally, Ph.D. candidates in decision sciences can take courses as part of the Wharton Business and Applied Economics doctoral program the spokesman said.

Both Harvard and Wharton will use a DECsystem-10 and a variety of terminal types in an interactive setting to give their students hands-on experience in computer operation.

Professional Development

S/32 Users Group Formed

LAS VEGAS — A new organization, International System/32 Users (ISU), has been formed to assist users of IBM's small business computer.

The group will offer a monthly publication specializing in educational matter and computer programs related specifically to the System/32.

Further details are available from the group at Suite 109, 1700 E. Desert Inn Rd., 89109.

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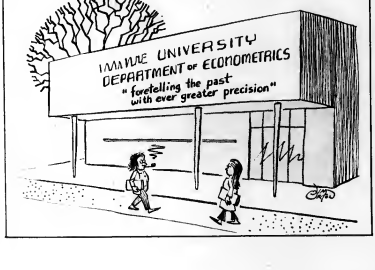

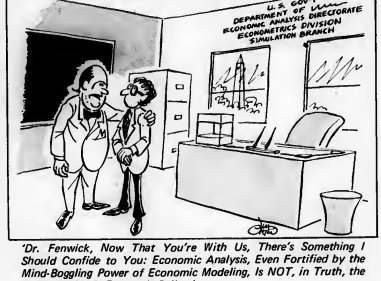

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Editorial

Get Involved...Now

Debate over proposals to license DP personnel has already begun in one state and others are sure to follow, which means DPers will have to get involved with the issue immediately.

There is no longer any time to take a "wait-and-see" attitude. By waiting, you may see ill-advised and ill-founded legislation not only introduced in your state, but also enacted into law.

Legislators are faced with mounting pressure from the public and some groups within the industry to take some sort of action in this area, but they will only be able to make reasoned judgment of the various proposals if they have input from the computer community.

So write or call your local state representative and the legislative committee charged with hearing licensing proposals, and tell them you want to testify or offer input if and when they begin investigating licensing proposals.

No one can do it for you. And the time to act is now.

Letters to the Editor

Ikeda's Death Felt Strongly

A few more words to add to Herb Grosch's Feb. 12 column on the late Dr. Toshio Ikeda of Fujitsu . . .

While Grosch may not have known Ikeda personally, his assessment of Ikeda's impact was correct.

During the past several years, Ikeda and I met many, many times – first professionally, later socially as well. I think we each offered the other a glimpse and some insight into our respective environments – both for technology and for style.

Ikeda was, without doubt, an individualist and a leader, and his company and his government were wise in supporting him in his judgment. His management style was a delight to those believing in the American tradition of assuming risk and responsibility, and it would have shamed some of our current practitioners of consensus and copout.

He fondly called his subordinates "hisomagari samurai," a picturesque and amusingly complicated way of describing them as strong-willed and independent.

And, in return, it was evident that they did not fear him, but respected and loved him.

Pursuing Grosch's theme one step further, it well may be Ikeda's death has affected not only the course of a company but, in that closely knit society, the direction of an entire nation.

Dr. Richard I. Tanaka
Senior Vice-President
California Computer Products, Inc.
Anaheim, Calif.

First Letter in 28 Years

Congratulations on your editorial, "No Guarantee," in the Feb. 12 issue! It is thoroughly expressed my feelings that I am writing my first "Letter to the Editor" in 28 years of direct involvement in DP.

There are a large number of us who feel the present societies are a waste of time, the Certificate in Data Processing (CDP) is worthless and the self-proclaimed "professionals" who are regularly in print do not reflect our views in any way.

Licensing, as proposed, is the most asinine approach to our problems that can be imagined – especially since it comes from people who are supposed to be able to evaluate options.

It is undoubtedly our fault that *Computerworld's* pages have been disoriented toward all this nonsense in the past, since most of us are too busy working for the best interest of our employers to make sure our feelings are known. Thank you for taking up the cudgel for us, and please be aware there is a great amount of silent support.

H.A. Hanson
Chicago, Ill.

'Pioneer' Asks Remembrance

All of us here at Chi Corp. read with interest the article, "Solutions Vary for Tape Handling Problems" [CW, Feb. 12]. I would, however, like to point out Chi Corp. pioneered the tape mounting display device, our Programmable Display System, which was first installed in May 1970.

Since that time we have sold many systems both here and abroad to a wide user base, including federal as well as commercial sites.

Richard B. Spivak
Manager of Marketing
Chi Corp.
Cleveland, Ohio

(Other letters and commentaries on Pages 12, 13 and 14.)

Letters to the Editor

Points of Reference

Important Thing

The varied and sometimes emotional responses to the letters and articles on nested IF statements have led me to believe we are all quite superficial in our understanding of the programming art.

When one codes a program, he constructs a mapping from the problem statement to machine code. When one debugs a program, he determines whether or not the mapping from the problem statement to machine code is correct and complete.

The proximity of the source code to the initial problem statement or to the executing program indicates the point of reference used by the programmer when coding and dubugging a program. The nested IF advocate should be aware that mapping from the problem statement to nested iF source code is simpler and more direct than mapping from source code to machine code.

In summary, the nested IF advocate encodes a problem statement directly and assumes the end product will be achieved. The simpie IF advocate encodes the end product directly and assumes the execution will be the achievement of the problem statement.

Peter C. Konieczko
Augusta, Maine

Nested iFs Can Solve The 'END' Problem

Edward Yourdon, in his article "Structured Cobol Needs 'End' Feature" [CW, Jan. 15], was right. Cobol nees an END statement whether or not one wishes to practice structured programming, but especially if one does.

A weil-written nested IF is a good way to articulate logic. Without an END statement, one must often resort to a series of individual IFs with GO TOs and paragraph names because it's not possible to make clear where the actions stop for the various branches and it's not possible to insert a subsidiary IF in a branch and have controi continue in that same branch after executing the subsidiary IF (instead of going clear out of the nested IF to the next sentence).

It gets even worse when one wants to mix IFs with the AT END of a READ or the AT END and WHEN of a SEARCH. One should be able to have a nested IF be subsidiary to any AT END or WHEN and one should be able to have any READ or SEARCH be subsidiary to some branch of an IF (nested or unnested). This type of thing is easily done in PL/I but is usually not possible in COBOL.

Nested IF decision logic is inherent in the way man's mind reasons, hence nested IFs are here to stay.

Robert A. Wonderly
Berrien Springs, Michigan

Possible Alternative?

Regarding Yourdon's article, would not the following code accomplish the same thing as Figure 3 and save the calls and the need to change the Cobol language?

```
IF P
    Perform X
    Perform C
else
    Perform D.
.
.
.
X. IF Q
    Perform A
else
    Perform B.
```

James Yankawits
New York, N.Y.

Society Speaks

American society, which is inherently conservative in the deepest meaning of the adjective, has sent us all a message. It's a message the supplier community has feared for almost two decades, since the 1956 IBM consent decree. It's one that I believe is unfortunate for IBM, very costly for computer users worldwide and dangerous in the very long run for our entire Western culture. In one sentence, it is "Don't damage IBM!"

I'm almost always asked, at the end of my speeches and seminar talks, to predict the outcome of the various actions against IBM, and especially about the federal case. I go into the enormous and hideously expensive, but extremely expert, IBM legal effort. I talk about elephant/mouse transactions (the Department of Justice, of course, being the mouse). I surmise that IBM has dozens of alternative consent decree patterns worked out and ready to offer if required.

But for several years I have then gone on to say that legislation and case law and detailed decisions and appeals reflect, aibeit slowiy and reluctantly, innate and generally conservative national opinion. By processes deep down in the thoughts and prejudices of judges and juries, prosecutors and defenders, general media commentators and noncomputer business circles, the huge size of the IBM stock market position, the contribution to the U.S. balance of trade, the favorable image of IBM compared with the ugiier corporations, the flag that IBM flies for us in Communist Europe, all tend to soften the monopoly image.

Anyone who can tell a transistor from a toggle switch knows that IBM is a monopoly – the most influential in our Western world. Anyone who knows enough law to argue with a traffic cop realizes that virtually every IBM technical and marketing tactic can be labeled illegal. But when the chips are down, when the time comes to nail IBM to the cross, that deep-down approbation, that fundamentai satisfaction with the IBM enterprise and image that permeates nearly all America and is frequently observable in Japan and Europe and even in the Third World, comes to the rescue. "Not proven," says the court. "Underpriced," says the stock market. "I'd sure like to work for 'em," says the senior.

Inside the trade, where we can see the eventual zero-efficiency future that predictably follows total IBM dominance, users and competitors feel very differently. We need variety, we need a choice. And the philosophers and the futurists tremble at a world only a few decades off, where all the information flows of society are controlled by a private multinational too powerful for any country or organization to influence: a corporation richer and stronger than most nations, and far better managed.

But deterrence depends on law, and law pretty much reflects social consensus. For the '70s at least, that consensus approves IBM. We computer people have a problem!

Herb Grosch

Airlines Group With Gripes

Good Luck, Peter–But Why Not Buy IBM Elsewhere?

Peter Hermon currently chairs a steering committee which is acting on behalf of no fewer than 14 international airlines [CW, Feb. 19] in an industry effort to force IBM to live up to its promises.

The carriers, which include Pan American, Japan Airlines, KLM, Swissair and Alitalia as well as Hermon's own British Airways, represent an enormous pressure group which is perhaps unique in its worldwide reach.

The Taylor Report
By
Alan Taylor, CDP

The promises involved concern both hardware and software systems. The group is also worried about the failure of some systems to achieve promised efficiency and also about the inadequacy of IBM's efforts to correct troubles after they have been discovered.

Why Expectations Fail

There is nothing new here nor are the concerns surprising. IBM often describes new systems in glowing terms and provides masses of technical data about their operation before the systems are staged with software.

Computer performance simulation is still not adequate to the task of substituting theory for actual work on a system and measuring its performance. IBM timetables for the life and death of its 370s, combined with its policies of discouraging the use of 360s for more than about four years, do not permit IBM salesmen to recommend their airlines customers wait until they see the system performance before placing their orders.

The descriptions Hermon is talking about – and the promises he recalls – are ones which in many ways must be considered theoretical only, even though they are the result of honest technical work.

Some Personal History

I have some personal reasons to appreciate this problem because, at one stage, I worked in London for another American computer company. And I found I innocently gave out wrong information.

The company did not seem to feel responsible when I found neither hardware configurations nor software performance were as I had been told. Indeed, one response to my complaints was, "we've sent you tons of publications and brochures. Now you tell us you haven't sold?"

Personally, I solved my problem by ducking – I left my London job and took a headquarters position, officially "to help solve the problem." But quitting jobs doesn't solve the problem of what to do with promises that are not kept. And that is what Hermon now faces.

One apparent solution, of course, would be to incorporate all promises in contracts. It's a nice idea, but I don't see it happening. IBM and the other computer companies are understandably conservative about what they put into contracts. They ask the systems area to use the information from manuals and other documents generally thought to be outside the protection of contract law.

Practically, therefore, to keep promises reliable, the airlines should find out whether IBM or any other computer supplier will meet its promises in some locality which doesn't excuse corporations quite so easily. Here, Hermon's committee, with members from America, Holland, Japan, Italy, Switzerland, etc., has unique capability to find out which nation is a good place to do this. Each airline could quickly determine whether such promises would mean anything if made in its country.

Then, when a place that does protect the user against innocently given but false promises is found, the airlines can take advantage of the profitability of software.

After all, if it performs properly in the Netherlands Antilles, say, it will perform properly elsewhere. Computer suppliers won't be inclined to go to the bother of making more productive software for one place than for others, even if promises are legally unenforceable elsewhere.

Software simply isn't like can openers, where the same item made in different countries can differ by changes in the thickness of steel. Software has no peritem cost to speak of – just the cost of a tape reel.

It is, therefore, fundamentally unlike other more traditional pieces of valuable property. And the airlines can take advantage of this in their search for reliability.

So, there is my suggestion. Use the geographical strength of the airline industry to get the support you expected, Peter. And, if you don't get it, yell.

After all, you have paid for it, and the airline-using public is very interested in your having the best available computer systems. And that is a widespread constituency.

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Letters to the Editor

Sneering at Macros Can Lead to Trouble

In his letter [CW, Jan. 22] Kenneth P. Seidel claimed a macro is "used expressly for the purpose of being freed from the messy detail of an expansion." Perhaps he doesn't know another use for a macro is to provide a standard definition and documentation of a record that is shared by many modules and programs.

Let us suppose that we have a program composed of 25 modules. Each module is used to process a single type of record and write out another record. The format of the input records is similar and so is the format of the output records.

Any experienced Assembly language programmer knows the wisdom and necessity of using macroinstructions to define these records. Some might even laugh at a "purist programmer" who is revolted by the storing of data into a symbol generated by a macro.

Seidel also claimed good documentation does not repeat the lowest level of coding detail. I guess he has never had to define an interface between programs.

In spite of this claim, I will still keep my copies of "System Control Blocks" and "Programmer's Guide to Debugging;" I do not choose to be ignorant. And both of these documents are not undelightful to read.

According to Seidel, only "fools . . . store into areas generated by macroinstructions, relying upon a generated symbol." My Webster's dictionary defines a fool as a "person lacking in judgment or prudence." I'll let the readers decide who deserves that epithet.

R.A. Sobieraj
Perth Amboy, N.J.

Take a Sabbatical

There has been a spate of articles and letters to the editor concerning the value to industry of computer science graduates. Most of these writers agree with George Glaser, president of the American Federation of Information Processing Societies (Afips), who complained "the educational system . . . has done little to provide for the needs of those who must apply computer technology, particularly in a business environment."

Although I agree wholeheartedly with Glaser's statement, I differ with those who conclude that the blame lies totally with the universities. There are some professors who have the industrial/business experience required to understand the significance of Glaser's remarks.

The problem is not as much with our lack of comprehension as it is lack of funds and, more significantly, qualified instructors to provide students with the required understanding.

Financial support from industry is needed to the extent that industry feels the shoe pinching. The invididuals best qualified for positions as university instructors in computer science are now very lucratively engaged in developing information systems for the very industries that are decrying the lack of qualified graduates, and they are not likely to release half or more of their incomes to become professors.

A man with the experience required to be a qualified professor of computer science almost certainly would need an alternative source of income to supplement current academic salaries.

Help in the form of teaching sabbaticals for qualified industrial personnel or monetary grants planted by industry to support appropriate professors would soon result in the harvest of many graduates with the qualifications they are now accused of lacking.

W.P. Davenport
Department of Computer Science
Acadia University
Wolfville, Nova Scotia

Start With Children

In Gifford O. Kucsma's letter [CW, Jan. 22], he states professional ethics are a moral issue and cannot be legislated. He also indicates one should give oneself an honest answer to the question: "Have I done my best?"

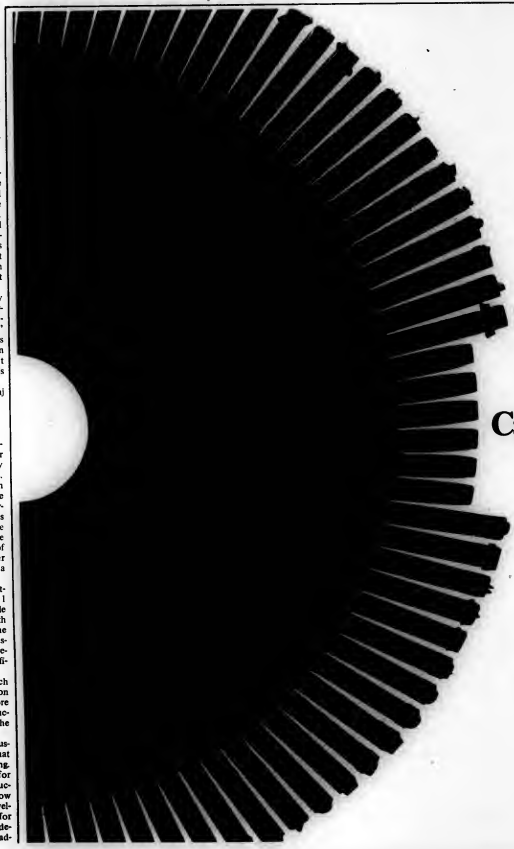
Kucsma's statements are well and good, and it is great to learn of those who feel moral issues should begin with one's own thinking.

It would seem, however, the learning of morals should begin in the home. Crime rates would be drastically reduced if parents would concern themselves with the correct and moral upbringing of their children instead of being concerned with gaining more prestige and a higher standard of living.

If this happened, we would immediately start raising a generation of children which would become a generation of morally and ethically concious people, eliminating the need for legislating morals and ethics.

Dell Aynes [CW, Jan. 22] advocates the death penalty for all DP personnel practicing without a license. If he would take as vigorous a stand for parents teaching morality and ethics as he has taken for having DP personnel being licensed, he would find that there would be no need for the death penalty for anything, nor would DP personnel need licensing.

Richard M. Marcotte
Florissant, Mo.



Carousel:

ACM Ombudsman Program No 'Weak Target' for Lord

By Joseph T. Rigo
Special to Computerworld

Ken Lord has gone too far.

His idea about making certification legally mandatory was so silly that no response was needed. It was like the college professor who can't get anyone to take his course anymore. He tries to get the course declared required for everyone.

Nevertheless, a lot of people were worried enough to write to *Computerworld*. Virtually all of them thought the idea was dumb – some vehemently so – but every single one of them spelled Ken's name correctly.

So the president of the Society of Certified Data Processors (SCDP) was encouraged. He dared to move on to bigger things.

But he made a fatal mistake.

He chose, as his target, the Association for Computing Machinery's (ACM) ombudsman program [CW, Feb. 5].

At this point, it is proper to say that I was ombudsman for ACM's New York City chapter for two years. I was a member of the national ACM Ombudsman Committee for one year. So much for that.

Lord's mistake was in thinking that the ombudsman program was a creature of the national ACM. He thought he was choosing a weak target. He was wrong.

National ACM, with its committees, its councils and its publications, is like one's beloved but senile Uncle Charlie. It is pathetically vulnerable to criticism. But woe to the outsider who tries to usurp the rights reserved for members of the family.

The strength of ACM is in its special interest groups, chapters and national conventions. These operations attract new members almost as fast as the national organization's publications and council actions drive old members out.

As it happens, the ombudsman program is a chapter operation. It was nationalized, more or less, a while ago, but its roots are local.

That does not mean that the program is snow white.

It was in 1970, I believe, that IBM launched its internal campaign against people who blamed computers for their problems. IBM did not like the way the term "computer error" was creeping into the language.

About this time, I walked into a meeting of IBM employees. I was late. As a combination lame excuse and bad joke, I blamed my lateness on a computer error.

"Programmer error!" they responded. All nine. In unison. Like a Greek chorus.

It was clear. IBM didn't care what you said about its programmers, but don't malign the hardware.

Chapter Activity

It was about this time Walter Carlson, ACM president and IBM employee, founded the ombudsman program.

From the beginning, it was intended as a chapter activity. Local ombudsmen would respond to problems in their own areas. It was thought then that they would deal with "computer error" complaints.

But the local people quickly expanded the scope to include public problems in general. The program acquired a life of its own – a life quite invisible to people like Lord, who see only the national committee.

Sometimes Worked

The program worked well in some areas; in others, not so well. I won't dwell on details. They are available from the ACM headquarters' professional staff – people who are paid to keep track of such things and do it well. One thing is clear: the program varies according to the local ombudsman.

The national committee sputters along from day to day. It means well, but this is 1975 and people aren't as worked up about social issues as they were a few years ago. It's really tough to mobilize a bunch of relatively well-paid computer professionals these days.

Back to Ken Lord

Which brings me back to Ken Lord.

Lord claims to represent a professional organization. That is, he admits to having a mailing list, a body of breathing members and, presumably, some mechanisms for guiding their activities within the society.

Lord also professes a great deal of concern about various unspecified social outrages.

Why, then, isn't he doing something about them?

Why is he writing letters to *Computerworld* about ACM?

If he wants action, let him show us what his own organization can accomplish. No one expects miracles. His group is small. But it should be able to do something.

We can then weigh its results in proportionate comparison with the ombudsman program. We will all be able to decide whether Lord has, in fact, set the example.

Then, and only then, will he be in a position to challenge ACM's 26,000 tired researchers to bigger and better things.

Reader Commentary

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Taking a Look at Professional Development

Need for DP Training Commitment Greater Than Ever

By Gopal K. Kapur
Special to Computerworld

During 1969 and 1970, I assisted San Jose (Calif.) State University by surveying a number of companies in the greater San Francisco and San Jose areas to determine the need for new DP courses.

Reader Commentary

The results were shocking. There were virtually no well-structured in-house courses for the general upgrading of DP management, systems analysts and programmers. Virtually nobody had any idea how and where operators received their training.

Even the very large corporations did not have well-established DP education or training programs. Career-path planning was seldom mentioned. Everyone expected to "hire" experienced people from some other company.

During the period from 1968 through early 1972, most of the companies I surveyed did very little in the area of DP education. A familiar mode of education planning was to rely on the computer vendor salesperson to recommend and, at times, even schedule DP personnel for vendor classes.

Most of the education was done as either a reward for a job well done or as a good diversion between job assignments to combat boredom and the urge to look for a job somewhere else.

Since then, things have not taken a turn for the better.

Recently I completed a survey of 125 application programmers to determine the extent of their education and training in the areas of their daily activities. The following table shows the types of seminar/workshop exposure of these programmers.

Type of Training	Yes	No
Systems Analysis	15	110
Program Design Methods	4	121
Advanced High-Level Languages	32	93
Coding/Programming Workshop	12	113
Documentation Methodology	9	116
Job Control Language	37	88
Debugging and Testing Methods	7	118
Data Management/File Design	13	112
Operating System Interface	34	91

From these figures it is evident corporate-level understanding of DP education continues to be quite poor, and management commitment and involvement in this crucial area leave much to be desired.

During the past decade the career-path planning and the education and training needs of the industry have been the subject of a great deal of speculation – often based on myth and always based on insufficient information. Efforts in these areas, at times quite sincere, have therefore been at best a hit-or-miss affair.

For the past three years I have been collecting and analyzing programs written by programmers with varied experience, educational background, and training.

My principal finding after studying these programs can be summed up in a single sentence: Most programs are conceived, structured and coded in an unintelligent way.

Almost no consideration is given to efficiency, proper physical structure of the programs or to proper language and software utilization. Internal and external documentation ranges from nonexistent to minimal and, often, is quite misleading.

Only a miniscule number of organizations perform postimplementation optimization on systems. In fact, most programs and systems are put together such that any postimplementation optimization requires extensive work.

Very few programmers are aware of their compiler and associated software deficiencies and inefficiencies; consequently they seldom code their programs to best utilize the available software.

An application programmer's knowledge of an operating system and the job control language is often little more than knowing in what sequence different statements need to appear. Even this knowledge is usually gained from looking at comparable job setups within the installation.

The majority of users rely on manufacturer-supplied manuals for guidelines on efficiency, program structure, language usage and documentation. And one only needs to look at some of the vendor manuals to find all types of inconsistencies.

One manual, for example, insists the programmer should not use any nested IF statements in Cobol; another manual by the same vendor extols the virtues of writing code with at least 10 levels of nesting.

Of the 50 organizations surveyed, only six had a "Programmer's Guide to Cobol" type of manual available for their application programmers. Of these six organizations, only four updated and revised their manual regularly; others found the job unmanageable.

None of the four organizations had any well-established method for checking programmer's compliance with the established standards and guidelines.

In most of the DP installations the programmers had successfully convinced the management that standards stifled creativity. This approach to systems development resulted in excessive maintenance costs, inefficient code and substandard utilization of both manpower and computer technology.

Now, more than ever before, I find that there is a great need to define the areas of corporate management involvement and commitment, career-path planning and education and training.

Computerworld welcomes commentaries from its readers on any subject of interest to the data processing community. Preference will be given to commentaries which are typed, double spaced, and no longer than 1,000 words. Commentaries should be addressed to: Editor, CW, 797 Washington St., Newton, Mass. 02160.

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COMPUTERWORLD

Photographed at the Sahara Casino, Las Vegas, Nevada

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Disk systems for non-IBM users.

School Hardware Earns 'F' Grade

ELYRIA, Ohio – A new computer system here scored an "F" on its first try at the county's 40,000 report cards, with an inaccuracy rate as high as 25%.

Some cards were three weeks late, and errors were found in both class schedules and letter grades.

Report cards and schedules for every school system in Lorain County are handled by the Lorain County Educational Computer Center here. The center is currently in the process of changing from an IBM 1401 to an NCR 200, and it has run into some major programming problems.

"The NCR company programs had been written and tested for much smaller schools and, when we attempted to use them with our large volume, they really bombed," said Lorain County Schools Superintendent Wayne White.

"The first year we ran the computer programs here five or six years ago, we had many problems.

"With this changeover, we are having a bad year again. We feel by next March it will take only about an hour to run off grade cards with the new computer," he concluded.

Restaurant System Helps Stop Pilferage

FT. LAUDERDALE, Fla. – A restaurant here has installed a computer to help stop employee pilferage and increase bookkeeping efficiency.

"I once caught an employee wheeling an entire prime rib out the back door," recalled Ed Fredericks, assistant night manager of the Train Station Restaurant.

Everything that comes out of the kitchen now must be recorded on a fill-in-the-blank type of check that can be changed only by a manager. The check is inserted into the computer to be printed with the subtotal, tax and total.

Consequently, there is a constant inventory control, and information is kept on items which are selling best, a waiter's productivity, his tips and how many people are sitting or already eating at any time.

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Haarstick employee Rod Minscher tends the cutter, which can cut 15 to 20 layers of sails at one time. The overhead cables connect the cutter to the computer in the background.

Plotter Hoists the Boom On Automated Sail Making

Special to Computerworld

ANNAPOLIS, Md. — Sail making, one of the oldest trades still pursued in a changing world, has remained the painstaking, cut-and-sew craft that it was in the time of the ancient Phoenicians.

But Haarstick Sails here recently adopted a computer-based production system that may transfigure the craft.

It is located in Haarstick's Annapolis loft, Chesapeake Center, Inc. (CCI), which opened last July. The system, combining a Hewlett-Packard 2100 with a Gerber System 90, incorporates the first and only computer-controlled sail cutter in the world.

The system makes possible the manufacture of sails at an extremely quick rate and guarantees sails of greater consistency and better quality than ever before, the firm claimed.

Not News

Computer technology in itself is not news to the world of yachting. For several years, computers have been used in yacht and sail design. The Massachusetts Institute of Technology (MIT) has developed an advanced yacht design program utilizing computers, under the tutelage of Prof. Jerry Milgram. Steve Haarstick, a sail designer, pioneered a program of computer-designed sails in his Utica (N.Y.) loft several years ago.

Haarstick is said to be the first, however, to make the step from design to production.

Problem of 15,000 Sails

Performance Sailcraft, Inc. (PSI) came to Haarstick with a problem two years ago. Its new Laser class sailboat had gone from zero production to a projected 15,000 in only four years. How could it product 15,000 sails to match, without sacrificing quality for quantity?

Haarstick enlisted the aid of Jack Lynch, who is now president of CCI. Lynch searched the garment industry for an answer to the problem and discovered a computer-driven fabric cutter designed by Gerber Garment Technology.

It took two years to develop the machine into the lighter, streamlined version that is now used. Haarstick and PSI opened CCI as a joint venture, and the loft has been cutting laser sails since July. The sail panels are cut and welded together; they are then shipped to laser sail lofts around the world for finishing touches.

The system is programmed by inserting a card with the absolute coordinates of the sail along an x-y axis, accurate to within 1/1000 of an inch, Lynch said. Connected to the computer by an overhead electric cable, one of the largest flatbead x-y plotters available rotates a blade along the coordinates.

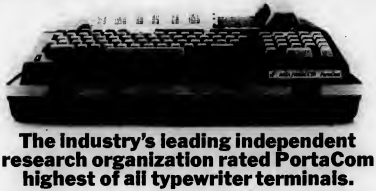
Large-Scale Plotting

Because the rotating operation is contained in the cutting unit, large-scale plotting is possible.

The cutter straddles a 6-ft by 36-ft table made up of tightly packed bristles. A vacuum pump holds the sailcloth motionless as it is cut, 15 to 20 layers at a time.

The result is a little short of revolutionary. CCI has been producing laser sails at a rate of about 300 sails a week. The sails are identical to a degree that has never been achieved by the old hand method, making for more even competition, Lynch noted.

Because stitching is eliminated by an ultrasonic seam welder, the new sails are also smoother.



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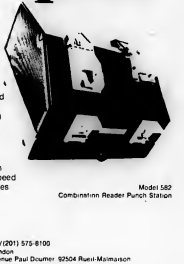

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Project to Simulate Safety of Helmets Meets Early Death

IRVINE, Calif. – A safety helmet standards research study designed to use computers and computer models has met a "premature death," according to Dr. Robert C.K. Lee, associate professor of engineering and director of the now-defunct project.

The Irvine safety helmet project had been operating on a first-year budget of $28,000, funded solely by the Safety Helmet Council of America.

Computers were slated to help analyze accident statistics and compile test results on existing helmets. Computer models would have then run impact simulation tests on various industry helmets.

Picture 'Looks Black'

Although the literature survey for the project was well under way and the computer simulation design started, more extensive software development was needed before the actual simulation models could have been developed.

"The picture looks very black, even though we have interest from local firefighters, motorcycle associations and even the U.S. Navy," who would like to see a safe, floatation-type helmet developed to prevent drownings, Lee stated.

"There's a lot of interest, but the money is not forthcoming," Lee added. He largely blamed the recession for the lack of financial support.

Until the Irvine project, there had been no basic research studies investigating means of head protection which might have contributed to safety helmet standards.

Programming Error Botches Test Scores Of Calif. Seniors

FAIRFIELD, Calif. – Due to a computer programming error, test scores of seniors in the Fairfield-Suisun school district have continuously dropped over the last four years.

Test scores for the standard aptitude tests are computed only for 12th-grade students, unlike those for the second, third and sixth grades, which heve risen each year.

'No Scores'

Programmers found the error resulted when zero scores assigned any student not taking a particular test were mistakenly figured into the average.

Cases resulted in which over one-fourth of a class did not take a test, but showed up as "no scores" on the computer.

"If this error has occurred for all 12th grade tests, it's possible that the percentile scores will improve to at least the predicted level, if not above," according to Marvin Woodstrup, director of educational services.

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Since 1958

Indiana Shop Suggests

Old Memories Often Bias New Package Selection

By Don Leavitt
Of the CW Staff

INDIANAPOLIS – Indiana Insurance Co. is typical of many DP installations. It has an IBM 370/145 and recognizes software packages might be useful. It has assigned a man to the job of evaluating packages, and it has bought several.

But the procedures the company follows in the selection effort tend to be quite informal. The problem may be one of old memories, according to Joe Nugent, who generally handles whatever evaluations are done.

When Nugent went to work at Indiana Insurance 10 years ago "the people in charge spent a lot of time analyzing a lot of packages, and they got burnt on a couple they tried."

Though the marketplace has changed radically in the past decade, and Indiana Insurance has moved from a 1401 through a 360 to its current 370, "they still don't let me look too deep" into current products.

There seems to be a general feeling, he said, that packages include too many programs and require too many user-written front-end and back-end routines to get them fully operational. If you've got to write that much, you might as well write the ones in the middle too, according to this thinking.

Doubtful or not, the company has acquired software from outside. There is no formal routine for initiating requests to look at new products. Nugent listens to comments from different departments and "starts looking to see what I can do myself."

If he feels the company's 12 programmers can handle the job, it moves in that direction. Otherwise, Nugent "keeps an eye on the publications that come flying through here. If something looks interesting, I'll send for more details."

"If the product and the concept begin to look feasible, I'll write to a couple of other places that have similar packages to get their documentation, too" and come up with a "go/no go" decision without any heavily structured review. One factor that is considered, however, is whether the logic could be developed in-house and, if so, at what cost.

Illustrating that point, he said the company had looked at one job-accounting package. Nugent knew Power was coming in and saw, with data from that, he could write what he needed for less than the cost of the package. So, he sent it back.

The time-accounting system that was then built in-house can include charge backs to using departments or outside organizations. It comes into play particularly with some users outside the company who come in during prime time, "As soon as they come in the door, we assign them a two-digit leading program number which becomes a billing code for all their work."

Insurance Application Programs

The DP staff also wrote its own insurance application programs, Nugent said, but the company went heavily to Pansophic Systems, Inc. for Easytrieve (an inquiry-retrieval system), Panvalet (a source program library package) and Pan-Sort.

Nugent has been particularly impressed with the Access Method (AM) option of Pan-Sort, which, he said, is similar in function to but better than one of the user exits IBM provides Cobol programmers.

The data center has at least one other package in its library, but Nugent knows little about it. A company actuary acquired the package from "somewhere" and brought it in. "I implemented it according to the instructions he gave me, and it's been running every since."

Isn't he curious about what it does? "No, As long as it runs and he's happy . . ."

The center has enough work now for a two-shift operation. In addition to the insurance-policy-oriented applications and the actuary's program, it supports payroll processing for the company.

It is "a little behind" on most conventional accounting, Nugent acknowledged. "We've got people who have been around handling those functions for 30 years, and it's hard to change."

He sees "critical changes" in the work load in a couple of years and said the company has a pretty good idea of what it wants to do. "We have begun to look at packages" to support the new directions – but may very well end up writing the programs in-house.

Conversions from one machine to another and from one operating system to the next have been "pretty smooth," he said, but not complete. "We've still got a couple of 1401 programs floating around, and we'll have to rewrite them" sometime fairly soon.

He knew who would get that job; "I'm about the only one around here who can do that."

IAS Controls Multiple Users, Multiple Modes on PDP-11/70

MAYNARD, Mass. – Interactive, real-time and batch programs can all be run simultaneously on Digital Equipment Corp.'s newly announced PDP-11/70 under control of the multilanguage, multifunction Interactive Application System (IAS), according to a DEC spokesman.

The operating system is said to support up to 16 interactive users and to permit simultaneous execution of Basic, Fortran IV-Plus, Cobol and PDP-11 Macro programs by different users. IAS comes with utility programs such as a shareable text editor and an on-line debugging facility, DEC added.

IAS organizes and manages system resources, schedules work to be done and supervises the flow of data through the system. Within the memory management software, passwords and user identification codes are used to protect application programs.

Read/write access codes provide further file protection, the spokesman continued.

Developed primarily by DEC's European Software Development Group in England, IAS is compatible with the language processors, file system and most utilities of RSX-11D, the real-time operating system for the PDP-11. In fact, an enhanced version of RSX-11D for dedicated real-time applications is provided with the 11/70.

The enhanced RSX-11D supports up to four terminal users on background program development chores, in addition to handling real-time tasks in foreground.

For dedicated time-sharing applications, on the other hand, DEC has an enhanced version of RSTS/E, a time-sharing system designed for large numbers of interactive users. The PDP-11/70 version of RSTS/E permits 63 simultaneous terminal users, the company claimed.

The Basic and Fortran processors included in IAS each use industry-compatible languages, with extensions. The Macro processor provides an assembly-level language.

Cobol-11 is said to be a fully-implemented Level 1 ANS Cobol '74 compiler, with "many" Level 2 features. Included with the compiler are a report program generator and a sort program, DEC said.

Free Debug Card Aids CICS Site

NEW YORK – Programmers and analysts working in a CICS environment may be able to reduce development and maintenance time sharply through use of a multipanded, pocket-sized CICS Debug Card developed by and available free from Telecommunications Technology Corp. (Teltech).

The first of four elements on the card, "CICS Control Blocks," contains a detailed description of the significant fields within the CSA, TCA and all transaction areas. Each field description consists of the field displacement into the control block of the field and the use and content at the field within CICS.

The second element is a "Trace Table Analysis" with a guide to its use. This assists the programmer in clarifying the sequence of events in a problem situation.

The "Dump and Abend codes" section lists the possible completion codes, the management module that requests a "dump" and a description of the causes.

The "CICS Debug Hints" section presents solutions not found in a manual by introducing specific methodology for solving the most often encountered abend conditions.

This guide is a step-by-step plan for solving specific problems and resolving a system "hung" condition. Because a high percentage of bugs are attributed to the inadvertent overlaying and destruction of free storage queue elements Teltech has added a detailed diagram and description of these control bytes.

Diagrams have been included to guide the user through pointers and chains during the debugging process. The diagrams include the total CICS architecture, TCA chaining, ENQ/DEQ chaining and CICS free storage queue elements.

Teltech will send one CICS Debug Reference Card per installation free of charge. There is a charge of $2/card, for each additional one requested.

The company is at Suite 300 East, Pan Am Building, 200 Park Ave., 10017.

Fortran Still Top T/S Language

DELRAN, N.J. – Four remote-computing networks earned outstandingly high ratings from their users in a recent survey run by Datapro Research Corp.

Each of the four was judged by five or more users and earned an overall score of 3.0 on a weighted average scale ranging from 1 (poor) to 4 (excellent.)

The top-rated companies were On-Line Systems, Inc. (rated 3.27), General Electric Co. (3.15), University Computing Co. (3.14) and Computer Sciences Corp. (3.04).

Responses from just over 100 users indicated they deal with an average of 1.74 vendors each shop.

Complete results of the survey, along with Datapro's summary of the capabilities of 98 remote-computing vendors, are in a 39-page report available now for $10 from 1805 Underwood Blvd., 08075.

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With Help From Infonet

Financial Planning Loses 'Onerous' Tag

By Don Leavitt
Of the CW Staff

Various remote-computing vendors have reported "strong market response" to management-oriented tools that enable users to better plan and control their businesses.

The experience of an East Coast-based company working with the Infonet service of Computer Sciences Corp. shows why this might be.

One person often seems to be the key to a company's growing interest in remote computing. In this instance the key is Adam Mann, an operations research specialist by background, now in the corporate personnel department, reporting to the director of manpower and organizational development.

His charter essentially is "to take on any client within the company and help them anyway I can." This could include computer techniques if they were appropriate, but ranges into forms redesign, work flow procedures and other concerns if they seem the way to help best.

Mann's "best customer" has been his own department. Within the personnel department, he "has automated everything" and used Infonet's Basic language, its Data Manipulation Language (DML) and its Financial Planning System (FPS) in the process.

Interactive Basis

Pension plan refunds used to be a "terrible job" since they involved three separate plans, that checked to see if the departing employee qualified for a refund, determined how long the employee had contributed – if at all calculated, the total interest, etc. Now the system is on an interactive basis, with prompting messages to help the clerk on each step.

Each plan has its own program so the clerk first activates the right one, then enters the data requested. If the system finds the employee does not normally qualify for a refund, it puts out a message warning against giving a refund unless a waiver is signed.

Key-ins of the money added to the employee's "pool," year by year, can be checked against a microfilm record. With that information entered, the system calculates interest, figures total check amount, prepares a notice to the accounting department to prepare the check, prints an explanation to the employee and generates a name/address label for mailing the check once it has been prepared.

Another example of an extended solution Mann was able to develop through the flexibility of Basic started with a monthly report to the corporate telephone operator, noting who has come and gone so that calls are no longer transferred incorrectly. Adding just a bit of information – such as exempt/non-exempt status code for new employees and departed employee's reasons for leaving – turned the basic report into a tracking document for the personnel department.

Currently, any idea of directly generating a new phone book has been shelved, Mann said, because changes are too frequent and "the organizational side of the operation hasn't caught up."

Though he set up the coding for most of his projects, Mann isn't a programmer openly. "If I can do it in under a day, it pays for me to do it – rather than taking two days to tell someone else what I want."

Budget Preparation

The biggest load Mann's efforts have taken off people's shoulders, however, is in the area of budget preparation. Typically, his work started in his own selection of the personnel department.

Budget prep used to involve completion of "spread sheets" which could include more than 200 line items for any one responsibility center. The sheets had to show item values across 14 columns – one for the previous year, one for the current year and month-by-month allocations for the coming year, as well as both row and column totals for the projected budget.

Changes in any of the monthly figures impacted the marginal totals. That in itself was awkward but consolidation of the spread sheets from subdepartments to develop department totals was even worse, Mann said.

In effect, "control and planning was suffering because the arithmetic was so onerous."

Mann tried to overcome the problem first under Fires, an old Infonet system. This was slow, however, and required each spread sheet to show the same chart of accounts – "which meant that every department had to carry an item (with zero dollars) for x-ray equipment, since the x-ray medical department needed that," Mann chuckled.

Now, with FPS, things are simpler. Each budget manager has a file identified by his own responsibility number. The data portion of the file is a D plus the four-digit number; Control is C plus the number; and Execution is triggered by L plus the number.

The user accesses the data file, names the line item and individual monthly "box" he wants changed, then calls for an execution. A hard-copy printout shows revised marginal totals and provides immediate comparison with the last run.

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'Ncode/Dcode' Protects OS, TSO Files But User Warns: 'Don't Lose the Key'

TEQUESTA, Fla. — The Ncode/Dcode software security system from Palm Beach Computer Consultants includes programs to maintain encoded data through the TSO editor and to encode or decode data sets on tape or disk in batch operations under IBM's OS.

For applications under IBM's IMS data base management system, the package includes a subroutine to encode/decode records or fields which may be incorporated in any higher level language program or executed dynamically as a load module, the vendor noted.

Although the Ncode/Dcode programs are independent of each other, they share a common cryptographic algorithm; the subroutine's algorithm is only slightly different.

It consists of a multipass byte transformation controlled by a numeric input key which determines the sequence of random number translations applied to the data, a spokesman explained.

Apparently anticipating comparisons with the heavy overheads imposed by some enciphering/deciphering routines in the pest, Palm Beach claims to have run timing tests for a data set containing 1,000 records of 80 characters each on a user's 370/165 under OS/MVT Release 21.6.

To encode or decode the entire set with a five-digit key required .68 seconds of CPU time. Another test, applying a 10-digit key to the same data set, required .83 seconds of CPU time, the vendor claimed.

Files truly are secure under Ncode/Dcode, Palm Beach claimed, noting that, even if an unauthorized person got hold of one file's key, the others would still be safe.

True, the files are safe in that sense, the user at the test site admitted, but if the user ever loses or forgets the key used when a particular file was encoded, that file cannot be decoded and it is lost.

The Ncode/Dcode routines have been run under OS/VS2 1.6 as well as OS/MVT 21.6 and require from 5.5K to 8.9K bytes of memory depending on the environment. The routines are available now under a $30/mo lease plan from the vendor at P.O. Box 3114, 33458.

Ledger Package Keyed to Total, Honeywell CPUs

ANDOVER, Mass. — The MMS General Ledger package from Software International Corp. is now available for Honeywell 2000 series and 4200 systems users of Total, the data base management system from Cincom Systems, Inc.

Although the ledger system is designed to produce many standard financial reports as part of its normal execution, it also includes a report writer subsystem so executives, clerks and non-DP end users can code their own unique report needs.

Once stored, these reports are also produced as part of the normal processing.

The new version of the ledger system works, in effect, as a host language under Total's data manipulation routines. It requires 64K minimum storage on the Honeywell gear, Software International said.

The software is said to include complete corporate financial reporting, capabilities to handle any general ledger account numbering system and the ability to control multiple ledger account numbering schemes simultaneously for subsidiaries.

The application logic also includes a "powerful" allocation capability, support for preparation of variable and fixed budgets and "unlimited" reporting levels. It provides intracompany transfers, accruals and reversals; automatic eliminations and adjustments; and a basis for forecasting, the company said.

The Honeywell/Total version of the MMS General Ledger is available now for $35,000, from Software International, Elm Square, 01810.

TelTech

CICS DEBUG CARD CUTS YOUR DEBUG TIME UP TO 50%

TelTech introduces the new CICS Debug Card. This Debug Card is the first comprehensive analysis of internal problems encountered in a CICS environment with solutions to these problems presented in an orderly and concise format. It also presents the user with a better understanding of CICS architecture and interacting elements without constant referral to mammoth cross reference manuals.

TelTech is offering one CICS Debug Card per installation, free of charge. There is a charge of $2.00 per card for each additional card requested.

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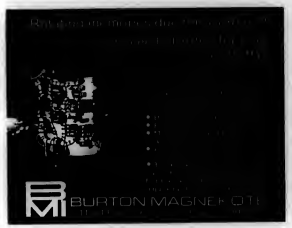


Features Added to Multi-CPU Scheduler

CHERRY HILL, N.J. – Value Computing, Inc. (VCI) has issued Release 6.0 of its Data Center Scheduling System (DCSS), which incorporates several major enhancements and a number of lesser changes.

Originally designed to aid users in developing total solutions to scheduling problems involving multiple OS-based IBM 360/370 mainframes, DCSS has now been modified to work in OS/VS environments as well.

The release includes an automatic calendar scheme, dynamic core allocation, additional schedule revision capability and more flexibility in the makeup of the reports generated by the system.

Under the automatic calendar scheme (ACS), entry of the current date is enough for DCSS to extract and then schedule every job that should be run on that day, no matter what processing cycle the job is on.

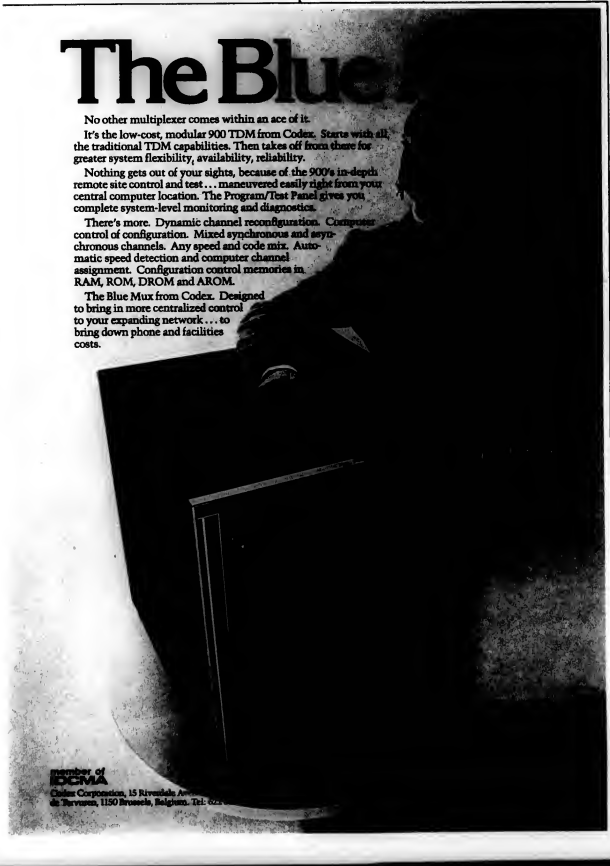
Previously, users had to enter separate requests to "activate" daily, weekly, monthly or other jobs. The frequency codes have been in the job records, but the advent of ACS marks the first time they've been accessible with one request, VCI said.

The scheduler normally plans the work load on the basis of the amount of main memory the user identifies as available. Dynamic core allocation, on the other hand, determines – on the fly – what space is actually available and puts it to use.

The additional schedule revision capability enables a user to interrupt an ongoing schedule of jobs with a priority run. DCSS clocks the time each job has run. Once interrupted, the system determines how much time it still has to run, based on its filed description, and sets the jobs with those remaining times at the start of the new schedule.

Release 6.0 is being distributed free to all current DCSS users. It can be acquired by others for $20,000.

VCI is at 300 VCI Building, West Marlton Pike, 08034.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The Blue Mux from Codex. Designed to bring in more centralized control to your expanding network... to bring down phone and facilities costs.
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Optimizer Uses Run-Time Counts

SOUTHFIELD, Mich. – IBM DOS, OS and VS users can have Cobol programs analyzed for efficiency at the source-code level, then monitored and analyzed to determine which parts are used in actual execution, with the Minimiser System from Computer Services Corp.

Software in the system is an expanded and enhanced version of the optimizer previously known as Minimiser and now called the Program Analyzer and a newly developed Activity Monitor.

The package deal also includes an on-site workshop on optimizing techniques, the vendor noted.

The Program Analyzer reports – line by line – on the quality of the user's source code, working with and in a manner very similar to the compiler. The analysis says, in effect, "This line is good (bad)," regardless of how many times it is to be executed or even if it is executable.

The qualitative judgment is keyed to the particular compiler and hardware combination being used, the vendor added.

The Activity Monitor counts the times a piece of code is executed, then weights that count with a factor representing the "severity" of the coding quality.

The user is provided with a table of severity factors, but can modify the weighting, instruction by instruction, if the given weight seems inappropriate.

The ultimate output of the system is a report for each line of code, in the form of a side-by-side double histogram. The first bar shows the number of executions that took place in the test with the user's own data; the second, the "severity" of the code involved.

The analyst would look for twin spikes and concentrate on improving the code thus "flagged," the vendor said. The analysis and, therefore, the histograms can be at the program, paragraph, sentence or verb level, he added.

The package requires 44K bytes under DOS, 88K under OS "but will steal more if it's available." The Program Analyzer adds about 75% to compile time but would not normally be used with each compilation.

The Minimiser System is available now for $7,500 from the company at 23155 Northwestern Highway, 48075.

Minimum 1 Cent Charge Applies

Datran Datadial Users Paying Time-Sensitive Rates

By Ronald A. Frank
Of the CW Staff

VIENNA, Va. – Users subscribing to the Datadial digital service available from Data Transmission Co. (Datran) are being billed according to the time it takes to transmit their data.

Datadial is one of the first digital services to charge users according to a time-sensitive rate. In addition, it also sets a maximum monthly charge based on hours of usage.

The service provides dial-up service in nine cities to subscribers at synchronous speeds of 2,400-, 4,800- and 9,600 bit/sec. Asynchronous transmissions at 2,400 bit/sec can be handled through a Datran-provided internal adapter.

In addition to the timed charges, Datadial users pay monthly recurring charges and initial one-time installation fees. At 2,400 bit/sec, the monthly charge is $80/mo with a $150 installation fee. At 4,800 bit/sec, the user pays $90/mo and a $200 installation charge; at 9,600 bit/sec the monthly charge is $100 with an installation fee of $200.

The monthly rate for the 2,400 bit/sec asynchronous service is $85 with an installation fee of $150. This includes the required Datalink connecting unit.

The timed usage rates are based on speed and a minimum charge of 1 cent per connection applies. The usage rate per mile per second at 2,400 bit/sec is .0000025 cents; at 4,800 bit/sec it is .0000033-1/3 cents; and at 9,600 it is .000005 cents.

For users with high monthly traffic volumes, there is a maximum charge that can be levied. The maximum charge is based on a prorated usage pattern spread out over 22 business days.

At 2,400 bit/sec, the maximum rate takes effect after 85.5 hours of usage or 3.9 hr/day. At 4,800 bit/sec, the maximum rate takes effect after 61.6 hours or 2.8 hr/day; and at 9,600 bit/sec, the maximum rate takes effect after 50.6 hours or 2.3 hr/day.

Any Usage Pattern

In order to build time toward the maximum rate, the user can accumulate his Datadial hours in any usage pattern. The hours of usage per day are averaged for the maximum time calculation because they are believed to be typical, a Datran spokesman said.

All quoted rates are based on a peak time usage which is in effect between 8 a.m. and 7 p.m. Monday through Friday.

For users who transmit their data on the Datadial network during other time periods, a 20% reduction in charges applies. Off-peak users therefore have to accumulate more usage hours each month before the maximum rate is reached.

In any case, all transmissions each month beyond the maximum rate requirements are free of timed-usage charges.

Some examples of the maximum charge can be taken from the Datadial tariff. Initial service will include the cities of Chicago, Houston, Dallas, Oklahoma City, Tulsa, Kansas City, Los Angeles, San Francisco and St. Louis. A maximum monthly charge at 2,400 bit/sec between Chicago and Dallas is $599.25; between Chicago and St. Louis it is $195.75.

At 4,800 bit/sec, the maximum charge per month is $679.25 between Chicago and Dallas and $275.75 between Chicago and St. Louis. At 9,600 bit/sec, the maximum is $879.10 between Chicago and Dallas and $349.90 between Chicago and St. Louis

The service is available to users only over links that are 100 miles or greater. For shorter distances, Datran private line rates apply.

Users outside the Datadial access areas can use phone company local loops or other arrangements to get to the nearest Datadial terminal point. Such arrangements will be billed at existing carrier rates, a spokesman said.

Among the options available with Datadial are an autodial capability (no charge); ahhreviated addressing which uses less than the standard seven digits; a privacy feature which limits the Datalink connecting units that can access a called station; a rotary feature that designates a second called station when the first is busy; and an analog bridge/manual switch feature that allows three access channels in a single Datalink.

Each feature costs $5/mo with a $20 installation charge. The analog bridge costs $30/mo with $100 installation.

Complete Datadial service is available from local Datran offices in the served cities.

Who Will Benefit?

VIENNA, Va. – The introduction of a timed charge for data communications users may force users to reevaluate their DP operations.

According to a rate expert at the Data Transmission Co. (Datran), most users now on private lines keep few records on the amount of usage they have per day, per week or per month. This data holding time will be important for users who want to compare cost trade-offs among Datran's Datadial, private line and Wats services.

In instituting maximum monthly rates above which usage would be free, Datran rate experts had to make some arbitrary assumptions on the average data holding times of the typical user. The validity of these assumptions will be tested when users begin operating with the Datadial service.

Based on present estimates, Datadial is a cost-effective choice for users comparing rates with AT&T's Dataphone Digital Service under certain conditions. At 2,400- and 4,800 bit/sec, Datadial appears to be better for users with two hours of daily usage. At 9,600 bit/sec, Datadial seems better at 2.2 hours per day.

Users who transmit less than two hours per day are obviously better off with the Datran service. This also applies to high-volume users who would regularly exceed the monthly maximum charge, according to the Datran estimates.

In a comparison between Datadial and Wats, the Datran rate experts estimate Datadial is more cost-effective than Wats up to 2,200 miles and 66 hours of usage per month. After that, Wats becomes more effective, they said.

At American University

Front-End System Ups Flexibility, Lowers Costs

WASHINGTON, D.C. – American University has replaced an IBM 3705 front end with a Memorex 1270, gaining added flexibility at lower cost.

"The Memorex 1270 equipment is doing all the same things our IBM 3705 used to do; is easier to use and rental savings are about $680 a month – that's 45% less," Robert Ogilvie, director of computer services said.

Besides the savings in money, Ogilvie explained, the 1270's automatic speed recognition and code translation features allow for a flexibility the former equipment could not equal.

The 1270 is able to communicate in all the commonly used communication codes, such as Ebcdic, Ascii or BCD, without software changes. It also adapts automatically to the speed of transmission from the connected terminal.

Line Changes Easier

"On the old equipment," Ogilvie noted, "we had to stop everything and fix the program, while with the 1270 we can plug right in to any of the line inputs."

It is easier to change lines on the 1270 since the switch can be accomplished by changing a wire in a plug board. This contrasts with the 3705, which required software modifications when a line was changed.

In addition to the 1270, the university has a terminal net that includes two Data 100 multipoint terminals. One of these is a half-duplex transmission configuration while the other is a Model 78 Hasp workstation.

The terminals transmit through the 1270 into the university's 370/145 mainframe.

The CPU runs OS/MVT, DOS and the Total data base management system from Cincom Systems, Inc., which is used for student enrollment, curriculum records and library records.

The library data is transmitted in batch mode each night at 1,200 bit/sec from an IBM System/7, which keeps track of books charged out and returned.

Students use identification cards which are entered into badge reader terminals to record a log file of book activity. The log file is entered into the 145, where the master file of library book status is maintained.

Four of the badge reader terminals are available at the library and the batched data from the System/7 is transmitted about five miles over a private line to the 370 at the DP center.

The university DP center has 18 lines hooked up to the 1270 terminal control unit. The equipment can accommodate as many as 96 lines, compared with only four for the 3705.

Of the school's 18 lines, two are leased phone lines operating at 4,800 bit/sec with International Communications Corp. modems. They are used for remote job entry and batch processing. The 15 remaining lines, used mainly by students in various classes scattered throughout the campus, operate at various rates less than 300 bit/sec.

AJ Adds OEM Coupler

SUNNYVALE, Calif. – Anderson Jacobson, Inc. has an OEM acoustic coupler, called the A246, which operates in originate mode at speeds up to 450 bit/sec and can interface with EIA and TTL/DTL standards.

The A246 costs $126 in quantities of 100 from the firm 1065 Morse Ave.

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Datapro Survey of Users Finds

Differences Small in Performance of Teleprinters

By Edith Holmes
Of the CW Staff

DELRAN, N.J. – A large and expanding demand for relatively unsophisticated keyboard/printer terminals has resulted in a proliferation of teleprinters which received near-equal ratings in overall performance from their users, a recent Datapro Research Corp. survey indicated.

In addition, user evaluations for the teleprinters produced by Computer Transceiver Systems (CTS), General Electric (GE), Texas Instruments (TI) and Univac were somewhat more favorable than those for terminals manufactured by Teletype Corp. and IBM, the two largest suppliers of this type of equipment, the survey indicated.

Defining "typewriter terminal," or teleprinter, as "any device that combines a keyboard, printer and data communications interface," Datapro drew responses from 233 users with a total of 5,370 installed teleprinters. Six of those users could be considered large users, with 100 or more installed terminals of a particular model.

The total number of terminals represented by these six users was 2,220, for an average of 370 terminals per user, the report said. The remaining number of terminals averaged over the rest of the user group worked out to 13.9 terminals per user.

The study noted many users reported on multiple models and/or vendors, resulting in a total of 440 user responses characterizing individual terminals.

Isolated Seven Models

While Datapro's report detailed the characteristics of 114 teleprinters from 54 suppliers, the survey isolated seven widely used makes of terminals, each rated by more than 18 users. These vendors included Teletype, IBM, TI, GE, Anderson Jacobson (AJ), Univac and CTS.

By assigning a weight of 4 to each user rating of excellent, 3 to good, 2 to fair and 1 to poor, Datapro calculated the weighted user ratings in categories ranging from overall performance to print quality and maintenance service.

Four manufacturers – GTS, GE, TI and Univac – tied for first place in overall performance with ratings of 3.3, according to the study. AJ received a 3.2, and Teletype and IBM brought up the rear with scores of 3.1 and 2.9, respectively.

Users evaluated their teleprinters in the "ease of use" category as follows: AJ, 3.3; TI, 3.3; CTS, 3.2; GE, 3.2; IBM, 3.1; Teletype, 3.0; and Univac, 3.0.

In the category of keyboard feel and usability, the survey put Teletype at the bottom of the list with a 2.6. Other ratings were 3.3 for CTS and TI, 3.2 for AJ, 3.1 for GE and IBM and 2.9 for Univac.

IBM received the best rating for print quality – a 3.1, according to the report. AJ and Univac followed closely with 3.0; GE earned a 2.9, and CTS and TI each earned 2.7.

CTS, TI and Univac took the lead once again with ratings of 3.2 in the area of hardware reliability. GE and Teletype were right behind these vendors with marks of 3.1, and AJ and IBM received a 3.0 and a 2.8 respectively, the report said.

Finally, under maintenance service, users rated GE, 3.2; Univac, 3.1; Teletype, 3.0; AJ, IBM and TI, 2.9; and CTS, 2.6.

On the basis of the 440 user responses gathered, Datapro found that 73% of the terminal applications developed are time-sharing. Another 39.1% are inquiry/response.

In addition, 30.2% are devoted to data transmission, 17.7% center on text transmission and 14.8% focus on document preparation.

(Continued on Page 25)

CRTs May Be Wiser Solution

By a CW Staff Writer

DELRAN, N.J. – Not all interactive applications are best served by teleprinters; many are more adequately satisfied by CRT terminals.

And users might want to be sure their choice of a teleprinter over a CRT isn't based "on an unrelenting obsession with printed matter." So said a recent report on teleprinters, produced by Datapro Research Corp. here.

"Based on current costs, however, few display terminals can compete with the rock-bottom costs of many typewriter terminals (especially teletypewriters), though the average unit cost of the tubes continues to shrink as the result of large-scale integration and high-volume production techniques," Datapro added.

Nonetheless, the research corporation suggested users consider several factors before choosing a teleprinter over a CRT display terminal.

For example, "CRT terminals are generally more reliable because of their total electronic operation as compared with the inherently lower reliability of electromechanical devices" like teleprinters, the report said.

In addition, display terminals "provide far greater flexibility in editing and formatting than do typewriter terminals." The report indicated, however, that a few teleprinters approach this kind of flexibility through the use of cassette recorders.

"CRT terminals are far faster in operation than typewriter terminals," Datapro commented, noting typical CRT output speeds range from 300- to 1,200 char./sec as compared with 10- to 30 char./sec for teleprinters.

Focusing on output media, the report pointed out display units don't use paper or inking devices, "thereby eliminating additional and continued operating costs for these supplies.

"A host of additional capabilities of the current breed of display terminals provide operating flexibility not available with typewriter terminals," the report said.

"And for those occasionally required printed copies," Datapro concluded, "most CRT terminals are available with a serial printer or an interface for a customer-provided printer."

For the computer still questioning, "Paper, terminals, or COM?"

Bell & Howell presents the compatible COM.

'Comstore' Converts Ascii to Baudot

MIAMI – International Communications Corp. (ICC) has introduced a data buffer store device that can convert Ascii to Baudot code, can translate asynchronous to synchronous transmission and can change the speed of transmissions to cut line costs.

Called the Comstore 1032, the unit has an MOS memory with up to 40K five-bit characters or 20K eight-bit characters. Data transfer is under the control of either an internal or external clocking source.

Input and output speeds can be independently set up to 4,800 bit/sec for simultaneous operation or up to 9,600 bit/sec for single operations, ICC said.

When converting from asynchronous to synchronous operations, low-speed teletypewriter message data can be transmitted over higher speed synchronous lines, thereby optimizing the use of the higher speed lines and reducing the need for low-speed lines, the company said.

As a remote buffer the Comstore 1032 allows data to be collected from a number of local low-speed terminals on dial-up lines, and data can then be batch-transmitted at a later time over dial-up or private lines to a central DP site.

Upward speed conversion allows data entry into CPU ports from keyboard terminals while downward speed conversion allows the use of low-speed CPU ports with higher speed CRTs. The unit covers a full range of speeds and character sizes.

The Comstore 1032 costs $3,105 or $97/mo on a 30-month lease from ICC at 8600 N.W. 41st St., 33166.

DM-1 Gives Off-Line Capability

FOSTER CITY, Calif. – The Datamaster-1 (DM-1) flexible disk storage and edit system is said to provide users of any Ascii terminal with computer-like capabilities for off-line storage, editing and retrieval.

The device, which has an RS-232 interface, can also transmit to terminal or computer at selectable data rates of 10-, 15-, 30- or 120 char./sec, the vendor said.

The non-IBM-compatible floppy disk system employs Memorex FD4 diskettes.

The DM-1's diskettes contain 264,000 characters organized as 2,000 lines of storage at 132 char./line. Average random search speed is .5 sec/record.

Operated from a separate control pad, the DM-1's data editor simplifies file updating while in record mode, with backspacing causing overstrike editing of prior characters, the vendor said.

Character deletions and insertions are made directly and the printed copy reflects the exact contents of the updated line, the vendor noted.

Block data editing is possible without rearranging the text and multiple lines may be inserted or deleted at any location.

The DM-1 costs $3,950 or may be leased at $155/mo from the firm at 1151 Triton Drive, 94404.

Ventel Micro Modems Run to 1,800 Bit/Sec

CAMPBELL, Calif. – Several miniaturized modems have been introduced by Ventel.

Operating from zero to 1,800 bit/sec, the 4-oz. devices provide all modem functions and options, all supervisory functions and EIA or CCITT interfaces all with no additional circuits or components required, the vendor claimed.

The micro modems are housed in a 36-pin dual on-line package that measures 3.6 in. by 2.7 in. by .335 in. (9.72 sq. in.). The single low-voltage requirement is ±15 volts at .1A.

Modes of operation include originate, originate/answer, auto-answer and originate/auto-answer. Microphone amplifier and speaker impedance circuits are included for acoustic coupling. Applications include both dial-up and private lines.

Prices of the Micromodems range from $75 to $250. Ventel is at 1190 Dell Ave., 95008.

Teleprinters Get Near-Equal Ratings

(Continued from Page 24)

The report also noted 43.2% of the terminals used by those interviewed transmit data at a speed of 30 char./sec. Speeds of 15 char./sec and 10 char./sec are common to 35.2% and 40.2% of these terminals respectively.

Only 1.6% of teleprinter users work with speeds of 60 char./sec, and just 3.4% of the teleprinters in the survey operate at rates of 120 char./sec.

Because not all of the users responded fully, figures on modem usage were skewed, the report stated. For example, on the basis of the survey, less than 30% of teleprinter users have Bell Systems modems, and only 23.2% operate with modems integral with the terminal.

Trend Toward Speed

"Nevertheless," Datapro commented, "the trends toward higher speeds and incorporation of the modem into the terminal itself are well supported."

And the research corporation predicted that, despite increasing user interest in the capabilities of CRT terminals, the need for low-cost terminals to satisfy a broad range of interactive applications, in which keyboard input and hard-copy output are essential, continues to exist.

Many users are also faced with a requirement for "low-cost, low-volume, printer-only terminals to satisfy those cases where hard-copy output is the only criterion.

Reprinted from the February supplement to *Datapro 70*, "All About Typewriter Terminals" is available for $10 from Datapro at 1805 Underwood Blvd., 08075.

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Link Warehouse, Seven Stores

Buffered Devices Boost System's Speed

By Edith Holmes
Of the CW Staff

CINCINNATI – A major department store chain here has switched from Teletypes to buffered terminals to increase the speed and cut down the overtime involved in a communications system linking its warehouse and seven stores.

Using a Wiltek System/500 data entry and retrieval system, Shillito's can now transmit data at 1,200 bit/sec and has eliminated the need to rerun many messages due to teleprinter malfunctions, Ken Jacobs, communications manager for Federated Department Stores, said. Shillito's is one division of this group of department store chains.

Located at Shillito's downtown store here, the installation is designed to communicate pricing and administrative information throughout the chain. Messages include markdowns of merchandise, transfers of inventory and changes in advertising, Jacobs commented.

Specifically, Jacobs noted markdown data is formatted to consist of a description of the merchandise, its code, style number, original selling price, new selling price and store branches and departments affected.

Pricing information enters the system via Wiltek's Model 500 CRT terminals, according to Jacobs. Operators create formats on the CRT terminal and transfer them via an MCR II reader/recorder onto magnetic cards for on-site storage.

When a message is prepared, the operator employs the MCR II to bring the format from the card to the CRT screen, then types in variable information.

With the completion of data entry, the operator presses a transmit button on the terminal's keyboard and sends all data except the format to the terminal's send buffer for temporary storage, he explained.

Every 30 minutes the terminals are polled by a Teleswitcher control unit, which transmits the information over dial-up Wats lines and Bell 102C modems to the location designated in the message.

The six other stores and the warehouse receive this information on Wiltek's Model 400 receive-only printers.

'Better Performance'

Installed in May of 1973, the CRT system "has provided us with much better overall performance than did our system of Model 28 ASR Teletypes," Jacobs remarked.

"Not only have we gotten away from 10 char./sec transmissions over leased lines, but we have batch processing using keyboard entry rather than the manual cutting of paper tape," he said.

On-site storage and retrieval of formatted data, bisynchronous communications and transmission independent of operator involvement are all considered advantages by Shillito's, according to Jacobs.

"We had the familiar problems with terminal installation and initial operation, and our operators had some difficulty getting used to the new equipment," he said. Though trained by Wiltek people, Jacobs explained "most of the operators' learning took place on-the-job."

The communications system at Shillito's runs smoothly now, however, and Jacobs speculated most of the operators would hate to part with the system.

Terminal Transactions

Qualterm Terminal Replaces IBM 2741

SAN JOSE, Calif. – Qualterm has an OEM teleprocessing terminal designed as a "fully compatible" replacement for the IBM 2741, it has announced.

The unit, called the X100, contains 15 moving parts compared to 3,200 "in conventional models" and, as a result, requires one-fifth the maintenance and service time, the firm said.

The X100 is a microcomputer-controlled modular system using read-only memories (ROM) for program control and random-access memories (RAM) for buffering and data manipulation. It communicates using Ascii code in an asynchronous mode through an EIA RS-232C interface.

Basic price of the terminal is $4,985, Qualterm said from 2005 O'Toole Ave., 95113.

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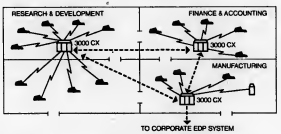

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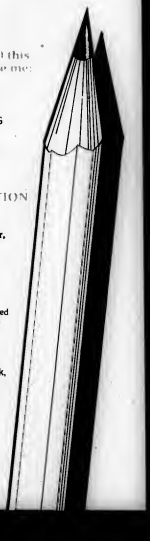

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A Computerworld Special Report

Packages, Nets Improved

By Don Leavitt
Of the CW Staff

Analysts and programmers *don't* have to do everything.

The wise or lazy (perhaps, indeed, they mean the same thing) DP professionals have learned the truth of that simple statement. And as management moves to get more use from its equipment and its staff, especially in the strained economy of today, interest grows in software packages, turnkey systems, remote-computing networks and – to a lesser degree – in custom programming shops.

Software packages are no longer just exotic Fortran routines designed to analyze electrical circuits, although there are some good packages that do just that. Today's packages are a good cross section of programs that can help the DP manager improve his own operation or go a long way toward solving an end-user department's needs.

The software vendors have come a long way in establishing themselves as reputable merchants and technicians.

Another indication of stability? IBM's "unbundling," separating the cost of hardware and software (and some other components), is usually recognized as the event that gave birth to the software industry.

But the fifth anniversary of that landmark passed at midyear 1974, without fanfare or oratory by IBM, the independent software firms or industry observers.

There were some sparkling new packages last year but it was largely a year of nicely turned-out, enhanced versions of previously available offerings.

Analysts and programmers don't have to do *anything* at all in shops that opt for IBM's new System/32 and its turnkey industry Application Programs or for Burroughs B1700 or B700 systems and its Business Management Systems. Or for System/3s, Basic/Fours, Singer System Tens, Data General Novas or Datapoint "terminals" and the turnkey systems that are now available from independent vendors.

The capabilities of the maturing remote-computing networks are complementing or supplanting the user's own DP shop.

The economic pinch of the early '70s flushed out a lot of the less stable nets and forced the survivors to manage their resources – staff and equipment – more carefully than before.

They stopped boasting about every new civil engineering routine they'd added to their libraries – and going out of business because users weren't interested. They started buidling communications software and operating systems – and staying in business because users *were* interested.

Cobol was recognized as an important tool and compilers were implemented on many nets. Interactive debugging was seen as something the batch-based user couldn't have on his own equipment, so it showed up on the networks, too.

There was once a time, oh Best Beloved, when "programmers" had to write instructions in machine code. And keep track of absolute memory locations of data and instructions so that operands would be accurate.

There was another time, later than the first great era but still 10 years ago, when early users of IBM's 360 – under BPS or BOS or ??? – could write in Assembler but had to interrupt the careful tracing of their problem solving to insert Channel Busy tests and Wait loops to keep input/output timings in line.

There is a time, and it is now, when some repeat the burdened ways of their forebears and that may always be. But there are others, and these a growing tribe, who know they cannot by themselves do all that must be done to tame the doubly demanding desires of men and machines by which they are surrounded.

They look, they ask, they try – to learn what others may have done – and if they find it good, adapt it to their own peculiar needs. The ones who know their own true limits may be, oh Great Theophilis, the only ones freed of those very limitations.

The user's desire to develop programs interactively but run them in batch mode, or move from one mode to another for any number of reasons, was accepted by many nets and that capability added to operating systems.

Inquiry/retrieval, remote job entry, initiation of work to be run "overnight" and data base management facilities all appeared as nets focused even more on the needs of the business community. And there are full-blown application systems available too.

On the Inside

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This special report was prepared under the direction of Don Leavitt, CW associate editor/software.

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Noname Names Pay II

Definite Steps Needed in Package Implementation

NEW YORK – Acquisition and implementation of a large-scale "packaged" software system can be a long-term operation with many steps. It can start with a review of the capabilities of more than a dozen apparently similar products and the vendors behind them.

It may then entail having the successful vendor add substantial customization before delivery of the system and getting the in-house DP staff and end users all thoroughly involved before implementation.

Teaching the end users to work with special tools such as a report writer facility to meet special but simple needs once the system is in place would be a further step.

That sounds like a lot of effort, but when the system being set up is payroll and personnel accounting for a multiunit supermarket chain, it's worth it. The system has to work and work well with no "glitches," according to D.P. Talker, system coordinator for Noname Supermarkets, headquartered near here, who outlined how his firm became a user of the PHI Pay II system from Wang Computer Services.

The transition began about two years ago, he said, when the company finally recognized its second generation Autocoder programs had just about reached the end of the road. Only one person knew the system or could recode it. And it was costing the company money to run the system in emulation mode on its IBM 370/155.

13 Packages

Talker began to look around and came up with 13 software packages with "payroll" or "personnel accounting" in their names. His first cut at culling that number was a review of the documentation the vendors supplied and, in some cases, demonstrations they offered. That ruled out several that just didn't do what the vendors claimed.

Some of the packages seemed reasonable, but the vendor organizations were too small for Talker's satisfaction. "Two guys just can't support a system seriously. And we didn't want to be anyone's experiment," he said.

Once the list was down to three or four likely candidates, Talker contacted users, primarily to see what kind of support the vendor really supplied. Noname Markets has contracts with some 42 different unions throughout its 100 or more locations and the system to be installed had to be flexible enough to cope with all the different benefit schemes.

Wang was selected partly because it was large enough to meet Noname's need for customization. In fact, the vendor developed and modified 15 separate modules for Noname before Pay II was delivered in December 1973.

Created Own Programs

Once the software came in-house, Talker, the DP staff and the using departments went to work on it. The user was "very definitely involved" right from the beginning, Talker said, noting that one employee from the payroll department, another from personnel and a third from auditing were assigned to the project full-time "from the day we purchased the system."

Though Wang customized the Pay II, Noname's DPers had to create both front- and back-end programs to complete the system. The front end is huge, "really massive," and includes edit routines, balancing and creation of what Talker called a "cycle master file," holding all transactions – each with an internally assigned transaction number – that form the base of an audit trail.

Pay II generates many of the standard outputs one expects from a payroll/personnel accounting system, but the Noname-created back-end logic also puts out reports feeding into profit-and-loss statement preparation, general ledger accounting, pension, health and welfare applications and other tangentially related areas.

In December 1974, just about a year after Pay II was delivered and three weeks before the end of the year and its associated special processing requirements, Noname implemented the system.

The timing meant that startup had to include creation of files with each employee's year-to-date earnings and deductions. Even so, things went smoothly and 15,000 people were paid the first payday under the new system, Talker said.

Rough Spots

The conversion period had some rough spots and Talker said he still hears some of the users muttering, "but I can just shout imagine what we'd be up against if we hadn't gotten them involved from the beginning."

Timing of the implementation was "more or less forced by management," he said, explaining the DP staff and payroll and personnel departments had been maintaining both the old and the new systems for a month before Pay II went live. And that was something the company couldn't afford for any extended period.

Talker said he liked several of the special features Noname got with Pay II. The Expanded Labor Cost subsystem was one such feature, and User-Defined Mneumonics (UDM) was another.

UDM, he explained, leaves part of the employee file for data of interest to the user organization and lets the user call the fields anything he wants.

Pay II's Expanded Custom Report generator facility is a "very handy tool," he went on. "Clerks can learn to use it and, in fact, creation of special reports is basically a user function."

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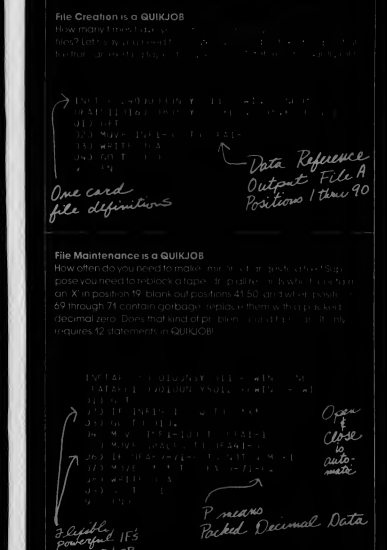
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Non-IBM Shops Want Packages

WAKEFIELD, Mass. – Most commercially available software is intended for IBM 360/370 shops. While that is certainly no surprise to anyone aware of the makeup of the installed user base, it means users of other equipment have to "go it alone," perhaps far more than they like.

A rather extensive mail survey of as many users of in-house Digital Equipment Corp. Decsystem-10s as Sofco, Inc., a new software vendor, could identify seemed to prove the point. The questionnaire provoked an impressive 40% return and, according to Sofco's president, Sy Morse, most of the respondents were very positive in their answers.

Morse split the responding users into two basic categories, commercial (including government) and educational.

On the other hand, the interest in outside software went across the board.

The users' experience to date has apparently been spotty. Just about half of each category said they had bought software from outside sources prior to the survey. But they weren't terribly happy with those purchases: 35% of the commercial shops and 20% of the educational centers reported bad experiences.

Good experiences were reported by only 25% of the business-oriented users and 50% of the institutions, Morse noted, and yet, on another question, 65% of the commercial sites and 60% of the schools or colleges responded positively to "What are your feelings about buying software applications?"

The figures went to 70% and 75% positive respectively when Morse asked about interest in software if it were "commercial T/S quality, including update and improvements." For the commercial shops, at least, that may be more than just wishful thinking. A total of 60% of the sites in this category reported having budgets for buying software.

The harsh realities of limited operating funds – and, perhaps, the recognition that relatively cheap but talented students were available – caught up with the educational sites on that question. Only 30% of those shops have a budget for outside software.

Dollars and cents also made a difference when Sofco asked the users about price ranges they could afford. The commercial sites felt quite comfortable up to $30,000; 52% of the users in business said they would be willing to spend $20,000 to $30,000 for software.

The academicians indicated they could cope with a price tag up to $5,000 but less than half would buy if the software cost more than that.

Working against a set of suggested answers, commercial users told Sofco of their major applications: business, 60%; finance, 30%; data base, 35%; engineering, 45%; and other, 1%.

The academic sites naturally had different use patterns: business, 42%; finance, 26%; data base, 42%; engineering, 33%; and other, 47%.

Even with the time-sharing facilities that have been built into the Decsystem-10, users told Morse they are in many cases still utilizing outside time-sharing or remote-computing services, apparently to supplement and not replace the in-house facilities.

Sofco developed the survey for its own purposes but is now selling the statistics and an analysis of the data for $200/copy from 1 Lakeside Office Park, here in Wakefield, 01880.

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Disk Space Wasted

Knowing Manual Seen Key to Better Sorts

FORT LEE, N.J. – It's "common knowledge" that sorting is a major part of the workload of almost all business-oriented DP installations.

Now an analysis of a number of IBM OS and OS/VS shops, conducted by Whitlow Computer Systems, Inc., documents how much sorting is done, what it costs and how that cost might be controlled.

DP folklore has long held that sorting accounted for about 30% of the average user's workload. This new study – using data from 58 sites, about 3% of all OS and OS/VS installations – indicates that with an IBM sort, sorting actually makes up 12.8% of the job steps, 15.3% of elapsed time and 15.8% of CPU time at the average site.

On the other hand, this raw resequencing of records used up 41.3% of the average shop's temporary disk space allocations.

Whitlow markets the Syncsort package and claims that the space set aside by the average user is a 319% overallocation compared with space actually needed if Syncsort were being used, carefully. But a Whitlow spokesman also noted that the space actually allocated was, on the average, about a 100% overallocation compared to the space needed if the IBM sort were being used, carefully.

The basic problem, as he saw it, is that analysts frequently are unaware of either the volume of data being sorted or the amount of space required by the sorting function. In order to avoid having sorts abort due to "sort capacity exceeded" – which would necessitate rerunning the job with another space allocation – they will in general be liberal in their initial assignments.

This solves the immediate threat of an abort but, since the user is still unaware of what the minimum allocation could have been or is anticipating growth in the sort input file, the overallocation becomes the permanent procedure.

Another problem is showing up more and more now as installations move from IBM 2319-type disks to 3330s without correcting their sort workspace parameters to compensate for the change in storage technology.

The most important thing the IBM sort user can do, Whitlow said, is to read the IBM sort manual. It's not easy reading and it will take time, the independent said, but IBM is right when it says everything the user needs

(Continued on Page S/6)

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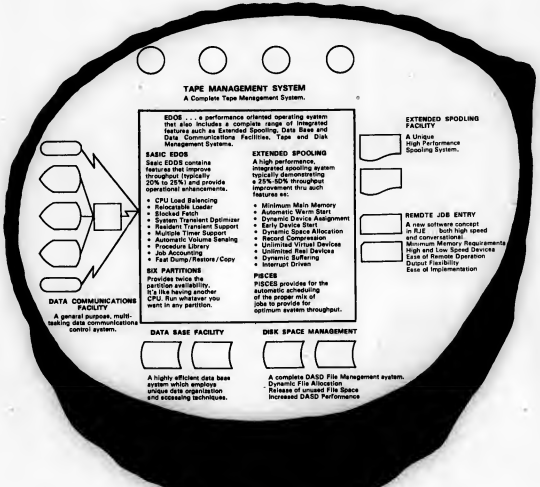
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(Continued from S/5)

is in that book.

Supplementing the data it collected on resources used for sorting, Whitlow also accumulated facts on aborts caused by users not allocating enough space for an IBM sort. Just over 8% of all sorts, or one out of every 12, failed, the researchers found, indicating that underallocation of space is also a problem.

Whitlow drew no conclusions of serious misuse from the number of job steps devoted to sorting, or the elapsed or CPU times involved. Backup material on individual sites indicated wide ranges around each of the average figures.

Sorting job steps ranged from as little as 5.1% or one user's total load to as much as 27.6% of another's. Likewise, elapsed times were delimited by a low of 4.3% and a high of 32.9% and CPU times by 3.8% and 41.9%. It is not surprising, somehow, to note that six different sites were responsible for the highs and lows in these three categories of resource use.

The spread on aborted sorts ran from 1.1% to 27%, while temporary disk space assigned to sorting ran from 2.5% to a whopping 74.5%. Even three-quarters of all temporary disk space apparently wasn't enough for the sorting needs of that user, however; 27% of its sorts crashed.

Whitlow appeared very concerned about how well its findings would be accepted in light of the company's interest in its own sort package. It stressed to *Computerworld* that the data from which its information has been computed is from the users' own SMF files.

AVERAGES

Number of Steps	12.8%
ET	15.3%
CPU Time	15.5%
Temporary Disk Space	41.3%
Abends	8.3%
Disk Space Over-allocation	319.9%

The analysis is available as a free service to any IBM installation interested in determining the characteristics of its sorting load and the effect of that load on the installation's machine resources, a company spokesman noted.

An extended analysis program, again working with SMF data, will report on such items as I/O device mix, use of exits, work device types and distribution of sort work areas assigned vs. number of spindles used.

Whitlow is at 222 S. Marginal Road, 07024.

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122 Products, 81 Vendors in $1 Million Club

INDIANAPOLIS — Three software products received special recognition at Million Dollar dinners held last week in New York and San Francisco.

Total, a data base management system from Cincom Systems, Inc.; Sort, a computer simulation package from Comress; and Mark IV, file management software from Informatics, have each grossed more than $20 million in revenue for their vendors, according to L.A. Welke, publisher of *ICP Quarterly*, who hosted the dinners.

Overall, there were a total of 122 packages and 81 vendors saluted at the dinners, first organized three years ago, to give credit to products that had grossed at least $1 million in revenues since being put on the market.

This year's totals represent an increase of 26 products and 16 vendors since last year's awards, an ICP spokesman noted.

Of the 26 new entries, 14 are application packages. The other dozen are systems or utility software.

'Talk' Tips $10 Million

Autoflow II from Applied Data Research has grossed $10 million, and it is joined this year at that plateau by Talk, a computer communications network design tool from Systems Architects, Inc.

Nine systems/utility-type packages reached the $5 million level during 1974, and so did three application systems, Welke found. Now there are 15 products for which the vendors claim that degree of popularity.

Another 54 products have attained $2 million each in gross revenues, attendees at the dinners heard, and this includes nine new application-oriented packages and 10 in the systems/utilities area.

The honor list for those packages popular enough to bring their developers more than $5 million in revenues includes Asist from Applications Software, Inc.; Librarian from Applied Data Research; Environ/1 from Cincom Systems; Management Science of America's Payroll/Personnel system and its General Ledger System; and the System 2000 from MRI Systems Corp.

Others topping the $5 million sales figure were Quick-Draw from National Computer Analysts, Inc.; Insurance Logistics Automated System from Network Data Processing Corp.; Panvalet from Pansophic Systems, Inc.; Intercomm and Score from Programming Methods, Inc.; Adabas from Software AG; Grasp from Software Design, Inc.; Life/70 from TCC; and University Computing Corp.'s Financial Control System.

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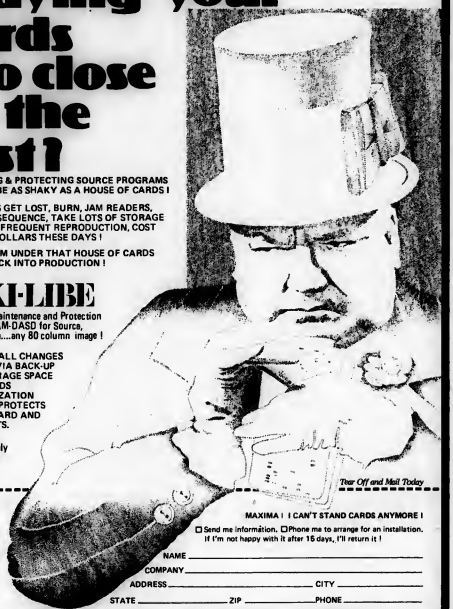

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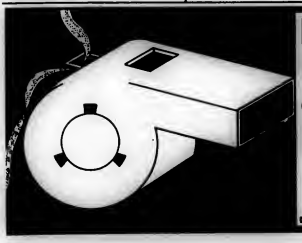

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DS-8

Buffaloed by Paperwork...

Convenient Food Marts Use Convenient DP Center

BUFFALO, N.Y. – Batch DP by an outside service organization has been the key to a number of successful operations.

CF Marts of New York, Inc. (CFM), based here, is a regional franchiser of convenience stores in western New York state. A few years ago, it reached the 10-store level. That's when problems really showed up.

"The paperwork was killing us. Getting people paid on time was a problem. We simply had to automate in some way," CFM President Dan O. Taylor explained recently. But, he added, "Our own computer was out of the question. Time-sharing would have meant overhead and in-house expertise.

"Bookkeeping machines would have involved continual upgrades of equipment. Any interim decision would have kept us from signing and training new owner-operators.

"We needed a permanent solution, a pattern for growth. Our accountants recommended leapfrogging to a 'final' system with a specialized service bureau. That's when we went to Automatic Data Processing, Inc. (ADP) – first for payroll and then accounts payable and general ledger processing."

ADP is a nationwide computer service specializing in bread-and-butter accounting applications.

In its promotional literature, CFM exhorts readers to "be the independent owner-operator of a profitable Convenient Food Mart store! Own your own business where the cash register never stops ringing!"

The invitation to financial independence apparently has a lot of appeal and may be good advice. In a little over eight years, CFM has granted 41 franchises and built annual sales to nearly $20 million.

One reason for the success is obvious: the company has capitalized on a phenomenon in food retailing.

The convenience store industry is the fastest growing segment of food distribution. Total sales rose 22.5% to $4.35 billion in 1973.

Another reason – perhaps the key one – is not so obvious. CFM claims it is the special "care and feeding" of its stores: the time CFM management can spend in the selection, training and service of owner-operators; time freed from the paperwork and administrative chores that can strangle growth in any business.

Finding the Time

It was to find this kind of time that CFM went to the local data center. And the move worked, according to Taylor. "The use of ADP has helped us grow faster with less overhead.

"To understand this, you have to understand just what we do and how we do it and the type of owner-operator we look for," he continued:

"A typical CFM store operator has anted his life savings, maybe $12,000 to $18,000 for this chance. He won't reach a cash breakeven point for six months to a year. We have to find the right people and help them succeed."

The data center-based system is simple and working. CFM provides ADP with payroll input on a Wednesday and gets paychecks back for distribution the next day. Stores use a unique replenish card system to trigger purchases and set up accounts payable.

Weekly summaries by vendor and store help consolidate disbursements and maximize discounts. A consolidated profit-and-loss statement gives CFM management a timely overview of operations when they most need it.

Aid to Expansion

Best of all, the system has helped CFM expand easily and cut costs, despite inflation. "We're open-ended now," Taylor said. "We can 'plug-in' new stores without added expense."

In the past two years, CFM has grown from 29 to 41 stores – without one addition to headquarters staff.

"In addition, we've been able to take some fresh approaches to cutting costs and boosting store profits. Like the weekly purchasing/gross profit report."

Saves Thousands

Taylor is referring to an innovation that has saved each CFM store thousands of dollars a year. It's no secret retail prices started to skyrocket in early 1974. CFM stores used to change prices only three to five times a year, relying on a conventional physical inventory every six months to reveal profit or loss. Weekly purchase summaries failed to reflect the retail picture, but ADP and CFM reasoned detailed purchases for any week were a fairly good measure of sales for the week.

By a simple extension of item purchase costs to retail prices, CFM could see the effects of pricing on profits before the sales were made.

"This one report tells us what kind of gross profit a store should make by vendor," said Taylor. "We estimate it saved well over $50,000 in the first half of 1974."

Management's Life Easier

The benefits of an outside service to CFM don't end with higher profits and plug-in growth.

Payroll deductions are kept to a minimum, and every employee gets paid at the same time, from one checking account.

From a store paperwork standpoint, payables are the heaviest volume. A typical store has 60 vendors. At an average of two-and-a-half deliveries a week, that's 6,000 transactions a week overall.

Each store merely fills in a replenish card as a payables voucher. These cards are punched as input to the system. CFM gets checks, a check register and a number of reports, including an aging of accounts payable, useful as a reminder of any vendor bills in dispute.

Taylor summarizes the advantages like this: "We have less office space, fewer people and lower fixed expenses than we'd have with an in-house system.

"Moreover, we have the flexibility to expand and more executive time to spend on areas demanding our talents."

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IU Goes to Cyphernetics

Remote CPU Provides Needed Power, Controlled Cost

PHILADELPHIA – A small but growing number of users are realizing that though they need computational capabilities, data collection facilities or a centralized data base – or all three – they need not have a large scale in-house installation to do the trick.

IU International, a conglomerate with operating units from western Canada, across the U.S. and into Europe is one such user. At corporate headquarters here, the company has a Digital Equipment Corp. PDP-8 and a collection of some 35 terminals of various sorts and sizes.

But that's deceptive, admitted assistant controller Robert Subin, who noted recently that the on-site equipment and terminals in many of IU's outlying offices are all tied into the remote-computing network run by Cyphernetics, Inc., Ann Arbor, Mich.

And the thing that makes it all a success is a long-term agreement under which Cyphernetics has taken on the role of a remote facilities manager for IU.

The conglomerate has grown in complexity over the past four or five years, reaching out from a base of gas, electric and water utilities into trucking (Pacific Intermountain Express, Ryder Trucks), ocean shipping, steel recovery operations and agriculture. That growth has been paralleled by very heavy use of time-sharing services through half-a-dozen vendors, Subin said.

Normal accounting chores are handled by outside service bureaus. In time-sharing, on the other hand, "we're fairly advanced in the use of planning systems and linear programming. We've always given our corporate staff, about 200 people, the tools they need to work with," he said.

Subin explained that IU corporate has a small computer science unit of five professionals, each of whom has a graduate degree. Part of its function is to develop some of the sophisticated programs needed by the corporate planners, but "more than that, it puts the tools in the hands of the user."

Centralized Data Base

IU has developed an extensive library of routines as well as some more complete packages, but the main function of time-sharing is to provide access to a centralized data base management system. The data base includes actual and planned financial data about IU's own companies and econometric models the corporation has acquired over time and now maintains.

"We do a lot of plant analysis, a lot of simulation," Subin said, adding that the workload is erratic enough so IU couldn't afford an in-house computer large enough to handle the peak load. That would require, he estimated later, a machine the size of an IBM 370/158 and the staff to keep it going.

Use of multiple vendors worked reasonably well (almost all the major vendors "have done a tremendous job in improving uptime" in the past two years) but blocked the centralized data base and the data collection capabilities IU wanted, Subin said. That's why the user went looking for a single vendor.

'Interesting' Process

IU went through an extensive study to determine those vendors that could do the kind of work the company needed done on a long-term basis. The whole process leading up to the selection of Cyphernetics was "an interesting one," which IU personnel have described at Info '74 and other American Management Association conferences, Subin noted.

The agreement with Cyphernetics, Subin said, is a fixed-price contract which allows IU to use an unlimited amount of a fixed portion of one of Cyphernetics' Decsystem-10s. As long as one of IU's nine ports is open, any of the terminals or the PDP-8 installed at IU by Cyphernetics can get in without additional costs.

After some specified time each day ("I think it's 6 p.m."), IU has access to any other parts of the Cyphernetics system that are available, as well as its own "private" part of the system, without extra cost, Subin noted.

Under the contract, Cyphernetics has one full-time account manager on-site at IU headquarters. The network also provides individual help for particular problems.

Cyphernetics provided the staffing to convert IU's programs to run in the Decsystem-10 environment and Subin was clearly pleased with that effort: "they put up a team of half-a-dozen people and converted a thousand programs in little less than two months."

The fact that many were in Fortran made the work somewhat simpler than it might otherwise have been, but a great number of them were coming off a Univac 1108 with "very sophisticated string manipulation."

Cyphernetics had to modify some compilers to accommodate some things like that which were machine-dependent.

Pleased with Cyphernetics' personnel, its communications facilities ("London is keying in data . . . so is western Canada") and its mainframes ("DEC 10s are the way to go"), Subin also gave the network good marks for the data base management system it provided.

System 1022 isn't a proprietary property of Cyphernetics, he noted, and it doesn't come under the Codasyl "standards" for data base management systems, but "it's very simple and economical and gives good access to our data." Developed by The Software House, it "works in a cost-effective way without requiring all the core some systems need."

Don't Wait for Clean Compile

Early Test Phase Planning Strengthens Development

By F.A. Schlegal
Special to Computerworld

Testing has been called the "last frontier" in data processing and, while that ignores some other major trouble areas in our industry, there's no doubt the state of the art in program and system testing remains primitive.

The overwhelming majority of installations go through the entire system development cycle to the point of clean compiles before they even begin to think about how to test the programs, much less the system, or how to meet user acceptance test needs.

This is archaic, since the same thing was done in the first generation and reflects a gross abdication by DP management of its responsibility to plan and monitor its valuable resources to attempt to eliminate missed dates, budget overruns and systems that don't work – and their costly consequences.

Acknowledged experts attribute some 50% of an average DP department's total budget to the testing function. It involves programmer time, machine time, operator time, systems analyst time and user time. There isn't a shop around that spends less than one-third of its computer time on compiles, program tests, systems tests, parallels and maintenance changes – and reruns.

And if you're past deadline, the percentages skyrocket as you factor in overtime.

Today there is little or no discipline in all aspects of testing. Why?

Clearly there must be another way, a better way. That is to develop the test plan *before* the programs are designed and to develop the test data during the system and program specification phases.

With so much of a DP installation's total resources involved in testing, managers are irresponsible if they don't control the utilization of people and equipment properly – or unsound fiscal managers if they ignore these statistics.

We need to step back and view the whole project development cycle from idea inception through live implementation. In this way, we can put various segments into perspective and assure success by working toward an overall plan.

This gives rise to such concerns as quality assurance and auditing through the computer, as well as overall project control. Most importantly, it returns DP to its purpose in life – serving the user.

How can quantum improvements be made quickly?

- Accept management responsibility by recognizing possible exposure and, therefore, the need to move.
- Resolve to establish test plans early – before detailed designs are started.
- Determine with the user what the acceptance test will be.
- Lay out a systems test plan and define individual programming and early system test standards.
- Define the techniques, tools and, most importantly, measurement criteria.
- Specify that test data will become an integral part of the system and program testing phase.
- Require the programmer to code test data at the same time the program is coded.

In other words, each individual involved must think about how he will prove the validity of his design or programming efforts. Focus his attention on the big picture. Let him know that you and he will be measured not on how much computer time is used but how quickly and effectively the job gets running. And running to the user's satisfaction before he has to see reams of live data.

Planning Paybacks

Planning for testing before the fact instead of after has some excellent paybacks!

- Management control of the project and staff is gained by a predefined set of specifications and objectives.
- With the proper test plan and tools, performance can be measured and monitored.
- You can relieve great burdens on the operations staff and reduce computer usage.
- You gain superior audit trails by retaining as system and program specifications the test data so defined and generated.
- Future maintenance will assure that each rewrite will produce the original as well as the updated output. The dollar and time savings of technical effort with this discipline can be extremely significant.

Accepting the concept of test planning and test data definition before the fact gains additional benefits. You are forced to define and standardize the test environment. Remote testing becomes a necessity, eliminating accountability problems and operations conflicts. Individual programs will be required to be debugged with test data *before* submission to systems test.

Systems Test Steps

Systems test will be broken into several steps. The first will be only to prove the validity of the system structure and its ability to interact, if necessary, with other systems. This would be followed by a volume test and then the user acceptance test.

Each of these phases can be standardized and disciplines and measurement tools established. Program tests can be limited to a specified number of records. Operational conflicts can be reduced by assigning a partition and a disk to the test operations and allowing no interface with

(Continued on Page S/12)

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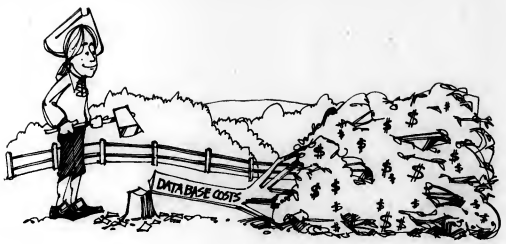

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Design Needs Early Test Plan

(Continued from Page S/11)

programmers during the actual test run.

With current testing costs generally high and user confidence – let's admit it – generally low, it isn't difficult to accept the need for a test plan in the earliest stages of a system's development and at every other stage, from feasibility study through to final testing.

Having test data defined at systems design time is logical since it is the analyst who generally knows the most about the application. He is the one who interviewed the user and worked on the specifications. He has the best idea of what needs to be tested to prove that he designed the system logic to the user's specifications.

On the other hand, it is the programmer who knows the detailed logic of the program. Good, bad or indifferent, he knows more about that program than anyone. Let him participate in the thought process at the calm of his desk, not in the heat of battle at the 11th hour. You pay him to think good code, why not pay him to think good tests and eliminate unproductive debugging?

Best of Two Philosophies

This approach permits the best of two philosophies: Systems should be tested independent of the programming effort and programmers are such a vital part of the testing process that they must be involved.

Further, the whole management team can now participate and the personnel evaluation process suddenly receives some revealing inputs.

The possibilities for management control of resources broaden by accepting the need for test planning.

- A variety of techniques and tools that previously had no purpose suddenly take on new meaning and value.
- Those uncontrolled resources devoted to testing can now be disciplined.
- Workable standards and procedures can be defined.
- Valuable controls to manage those resources can be installed.
- And, most importantly, you can improve results by delivering products with more validity to the user in less time.

Substantial savings of people and hardware time can be affected by a test plan philosophy combined with standards, procedures and workable tools. Accept this fact of life and you open up a whole new set of management challenges with substantial payoffs within your reach. Testing is definitely the last frontier of data processing and it must be crossed.

Schlegel is president of Management and Computer Services, Inc., a software and facilities management firm based in Valley Forge, Pa.

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Loyalty Eases Payroll Update

BENTON HARBOR, Mich. – As the software industry matures, customer loyalty may become as much a factor in choosing new software as a careful evaluation of several competing packages.

That at least appears to be the lesson to be drawn from Whirlpool Corp.'s experience with its payroll system for salaried employees.

The corporate data center recently completed implementation of the Whirlpool Employee Information Support System (Weiss), based on Pay II, a payroll/personnel software system from Wang Computer Services, Inc. The selection of the Wang package to be the heart of Weiss was "a fairly simple one," according to David Tully, payroll systems supervisor, since Whirlpool had had good experience since 1970 with the package now called Pay I.

A task force was created at Whirlpool in 1973 to consider what, if any, future there was for "human relations" DP. They assessed both the need and the form such processing might take, and those deliberations led to the idea of an integrated personnel/payroll system.

Whirlpool's DP capabilities had grown substantially since the last system was implemented and, with the growth, remote job entry of all data related to salaried employees throughout the corporation became more feasible. And the potential for providing management with tools for corporate-wide talent searches became obvious.

When it came time to consider the actual amalgamation of payroll and personnel processing, however, Tully found there were several ways to attack the problem. The corporation could have kept going with Pay I and with a "home-grown" personnel system and built an interface between them.

Other options were to rewrite everything in-house or to evaluate the capabilities of some of the packages then being marketed in the general area of payroll and personnel.

Whirlpool was already a Pay I user and Wang gave the company some consideration for that. The quotes for Pay II were "very reasonable," according to Tully.

But other considerations also worked in Wang's favor. Since Whirlpool knew Pay I "cold" and was used to its approach to transaction processing, there appeared to be minimum training required to move to the compatible Pay II system.

Whirlpool went live with the full Weiss operation last month. The system now has a data base of information on some 10,000 employees in nine locations.

The implementation of Weiss did not include any parallel run, he noted, adding that "we went straight in after testing each of the programs we wrote." The corporation hasn't been through any quarterly or year-end processing, but Tully appeared calm: "It all looks the same as Pay 1, so we're not really worried."

Tully gave Wang credit for maintaining the tax calculation routines within Pay II. This is e critical problem for multistate operations such as Whirlpool, and Wang has been "very good about it."

Whirlpool has identified some problems that had escaped Wang's testing cycles and Wang "has been – by and large – very good" in handling those situations.

The vendor has been able to point out, in some cases, things that Whirlpool was doing wrong. But when the problem lay in the Pay II coding, it was fixed.

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Inland Gets 'Assist'

DP Department Lightens Load, Lets Users Write Own Programs

By E. Drake Lundell Jr.
Of the CW Staff

CHICAGO – The DP department at Inland Steel Co. here is getting an assist – in more ways than one – by letting user departments essentially write their own programs for specialized reports.

Using the file retrieval and report modules of the Asi-st data management package from Applications Software, Inc. (ASI), Inland is able to permit user departments to write their own programs at a rate of 600/mo last year and the use of the system is growing.

The users, who do not have to be familiar with computer programming, use a specially designed form to write the programs in question.

Most of the time the user is operating against files that are built as a routine part of other systems run by the firm, Jerry Crown of the firm's systems and production control section said.

A systems analyst defines the files within the system based on requests from users, he said, and presently there are about 100 files defined for regular use by user departments. Since they are working against standard files, the file definition process takes about a day, Crown said, but once it is completed the field is then in the systems repertoire.

All of these files are listed in an index or dictionary which is circulated to user departments and all files are assigned a unique number.

From this base the user uses a specially designed form to outline the parameters he wants in a special report. He can also specify the form of the report.

This form is based on one supplied by ASI, but is simpler to use and contains more explanatory information, Crown said. It does not have all of the features in the standard form, but does contain more explanations of the commonly used items and contains detailed instructions on what each section means and how it should be filled out.

The first section of the form contains the title of the report and an indication of the fields that will be used in its compilation.

Next is a section outlining the characteristics and values of records that the user wants retrieved. The first section, for example, might indicate the payroll file is going to be used and the second section would then indicate annual salary information was the specific information being sought.

Next there is a section for defining the specific records that are to be selected, such as all women employees with an annual salary between $10,000 and $15,000.

The user can select multiple items in this group, in effect establishing multiple parameters for the program. In an ongoing example, other parameters could be departments, age, length of employment and so forth.

Specific Calculations

The next section of the form allows the user to denote specific calculations he would like to see performed on the data. For example, if he wanted yearly salaries broken down to give monthly figures, he would note here that all totals should be divided by 12.

In addition, this arithmetic section can be used to add more than one field together in order to create new, temporary fields for the purpose of the report.

The last section to be filled out by the user specifies how he would like the report printed or the format he would like for it.

The filled-out forms are sent to a central clearinghouse which reviews all the forms to make sure they are filled out properly and to log them in.

The forms then go to be keypunched for batch processing overnight, and the report is delivered back to the user in the morning.

To date user reaction has been "very enthusiastic," Crown noted, pointing out there was an average of 150 requests a month for the service in 1972, 300 per month in 1973 and 600 per month last year.

The firm has been using Asi-st in the application since 1972, he said, when it upgraded from a package that was similar but not as powerful.

The Asi-st package permits the user a great deal of flexibility in the selection process since it allows him to enter a "large number" of parameters for the report categories. It is also more flexible in the type of reports it permits the user to specify, Crown noted.

Another advantage, he said, is the provision that allows field-to-field arithmetic, permitting the creation of temporary files for specific purposes and specific reports.

A further advantage is that Asi-st allows the user to put in requests against more than one file at a time and also permits multiple requests against single files with one loading of the job code cards; with the other system, job code cards had to be entered every time a file was to be used.

Before, Crown said, if a file was to be accessed by seven different reports it would have to be called up seven times, but with the new system all seven (just to use a random number) requests can be answered on one pass.

Initial Problem

Inland has had "no major problems" with the system, Crown said, noting it was interfaced with an in-house developed access method dubbed the Hierarchical Basic Data Access Method.

At first, however, there was some problem with the hierarchical files, which may have had three or four levels of hierarchy. The problem was overcome by defining the fields to look sequential for Asi-st.

It is impossible to quantify the advantages for the system, Crown noted. In the first place, it used to take four to six weeks for users to get special reports.

Now such reports are being done overnight, so many more are requested and used in the day-to-day operations of the firm.

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Test Period Critical in Package Selection

FENTON, Mo. – "I'm from Missouri – show me," is more than a quaint saying to the software specialists at Meritz Corp. It sums up their approach to all packaged software.

Meritz is as interested in packages and as casual in the early stages of any evaluation process as most users. But in the end, before a final selection is made, the company always tries to get the software in for a trial period.

Some vendors allow a free trial, some don't. In either case "we want to get our hands on the package and run with it ourselves, to see if it works," explained Rich Brockland, one of the Meritz specialists.

Meritz is a "sales motivation" organization. It sets up campaigns to motivate clients' salesmen to do a better job or sell a certain product. Sales goals are set and the Meritz computer center – built around an IBM 370/145 under DOS/VS – tracks the progress of each salesman to his goal, sending out rewards as targets are met.

Hes to Be Good

The system has to be good, effective and accurate. Meritz is set to handle daily reports of sales from any number of client locations so it can determine how well the campaign is going.

The client salesmen treat the system almost as if it were their payroll accounting (and, in effect, it is). Client management has begun to depend on the Meritz-collected sales figures since they are more timely and more accurate than the client had been able to collect on its own.

Thus far, there is no formal request form or planning group to send Brockland on a quest for a new package. One way or another, he gets wind of a need and starts to look around.

He talks to other users in the area to see if they have had the same problem he faces and – hopefully – have found a solution.

Chain Reaction

Finding a lead to even one likely package may cause a chain reaction, Brockland noted. "Sometimes a person who sells one package will tell you if there are others around."

He tries to locate four or five comparable packages but "doesn't spend forever doing it." Reading descriptions of the products is only useful to see what they are expected to do and what the market is asking for the capability.

The trial period phase of the evaluation, coming next, is utilized by Brockland as much as possible – even for programs and systems as large as data base management systems.

A few years ago, the company looked at and finally acquired Total from Cincom Systems, Inc.

Brockland ran live tests of Total himself to make sure it would do what Cincom claimed it would and to get timings out of it.

Meny shops are afraid of a live test of a data base system, but Meritz set up a "very small test application" to confirm what the system does and to check out its basic operations.

"I wanted to see if retrievals from loam files would be fester then IBM could give me and if Sequential retrievals would be slower, as Cincom said."

Brockland said he felt a data base of a couple of thousand records would give him an idea of what a base of 100,000 would do. And that's all any test situation can provide.

Looked et Independents

Meritz' experience with IBM's source library maintenance system led Brockland to look at librarians from independent vendors. The IBM software cost no money, but cost "quite a bit of time in maintenance of the file itself."

Running Out of Time

"We were running out of computer time and had to find another solution within a reasonable cost limit.

"In this case, we could put a fairly precise cost figure on the computer time used by the IBM software" so he had a target against which to work. He looked at just the two major library packages, realizing that there might be others but he would probably be satisfied with either of the two under consideration.

In still another area related to improving the operations of the DP center itself, Meritz looked at what was available for time and job accounting and decided to build its own program instead. When that decision was made, Brockland explained, Meritz needed only a few figures to account for use of the computer system resources.

Most of the commercially available packages provided many statistics, "more than we could use. And they were more expensive than the company felt it should pay."

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Updated System Gives On-Line Data Base to Users

ANDERSON, Ind. – "We've been redesigning most of our systems so our users can have access to the computer from terminals in their own offices," said Anderson College's systems programmer, Tom McLaughlin, explaining why the college has moved from a batch-oriented IBM 1620 to a Hewlett-Packard (HP) 3000.

The shift has been a clear success although there were a few early rough spots since Anderson was a "beta test site" for HP's Image data base management system.

Prof. Tom Harbron, director of the college computer center, saw the difference between now and 1965, when the 1620 was installed: "[Then] I had to go around to the administrative officers to sell them on the idea that the computer could do the job better and easier than the way they were doing it.

"They'd listen but end up with 'We'll think about it.' Now, with this [HP] machine, we have the opposite problem. I have to bolt the door to keep them from breaking it down."

McLaughlin is currently the only programmer setting up transaction-orientation routines for the registrar, the business office and the other administrative users.

"We've done just about everything we projected for this system," Harbron said, "but I've got a bigger backlog of projects than when I started. It just doesn't quit."

Effective Blend

The Image software provides the college with an effective blend of interactive data entry, inquiry and retrieval and batch processing of jobs with substantial output.

The data base approach supports a pooling of common information which works very well in the campus situation where many students (who are, therefore, of interest to the registrar) are working their way through college as Anderson employees (which interests the business office).

Users key in a password and then student's Social Security number to reach his file, then name the operation they wish to perform. Image, and McLaughlin's routines, check the password-function combination to ensure the user is authorized to perform the operation.

That approach means there is no restriction on which terminals can be used for particular tasks; if a unit in the registrar's office is unavailable, one in the business office can be used without any problem.

On the other hand, data that is "proprietary" to one of the offices and is inappropriate for others to see, including students who also use the system, is protected.

In operation, Image and Anderson's techniques of using its capabilities produce some interesting results. After the interactive data entry, for example, the user can initiate a batch processing run from the terminal.

Regularly scheduled batch runs, however, are handled at night, even if no one is in the computer center. McLaughlin wrote a "program that says to the job scheduler, 'put the system to sleep till such-and-such a time.' We set the time for midnight, then put this ahead of all the batch runs.

"The system wakes up at midnight and goes to work, spooling all output to disk."

There are about 1,800 students at the college and registration was under way as *Computerworld* was talking to Harbron. It took about 30 seconds to register each student.

Batch runs later will create class rosters and all the supporting paperwork to put the spring term together.

The students themselves get a crack at computing during some of their courses and in any given term about 400 of them work with Anderson's HP 2000E or the 3000. The college has a general rule that the 2000E should be used for anything it can handle and everything else goes on the 3000.

At Anderson, administrative jobs have the highest priority during daytime prime hours. This could have created problems for the students, the professor noted, if a compute-bound job dominated the CPU.

There were some of those, he said, but even so it wasn't unusual to have three or four students and a dozen users overall all running at the same time. And the students were still getting "fairly decent response time," he added.

Anderson elected to go to HP and a mixed time-sharing/batch capability when the 1620 just couldn't handle the load anymore.

"We'd done a lot of things to prop it up over the years," Harbron said, but more than that, McLaughlin thought, the professor saw time-sharing as a way to stop "lock-grasping."

As long as user departments have the responsibility of entering data and initiating the batch runs, they can't blame the computer center for their problems, he said.

Year Late

Image was about a year late reaching Anderson, but Harbron doesn't hold that against HP.

"They hadn't actually announced it or sold it or anything like that. It's just that it was delayed from scheduled delivery date" and, even though the college was only a test site for the system, "we'd made plans based on the earlier date," the professor said.

Now Harbron is "reasonably satisfied. It's doing a real good job for us." He added that HP had made some changes in the system design at the college's request.

The only real serious problem Image had, he said, was one that is common to many data base management systems – control of concurrent updating requests.

HP handled that "very simply," by locking the root file and keeping everyone else out while the change was being made. But the overhead associated with that was "more than it needed to be" and Anderson suggested some changes.

HP implemented the changes "and that cut the overhead about in half," Harbron said with obvious satisfaction.

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Data Communications

Course #1010 –

Practical Data Communications Systems and Concepts

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Chicago – Jun. 2-3
Orlando – Jul. 2-3
Washington, D. C. – Jun. 9-10

Course #1020 –

Advanced Teleprocessing Systems Analysis and Design

This course is a follow-up to Course #1010, with special emphasis on problem solving techniques for minimizing operating costs in commercial data communications networks. Also led by Dr. Dixon Doll, the course covers procedures, approaches and algorithms for evaluating and cost-optimizing network organizations.

This seminar runs three days, and total cost, including an extensive set of customized course materials, luncheons and continental breakfasts is $450. Additional registrants from the same company qualify for a reduced rate of $400. Current schedule is as follows:

Los Angeles – Jun. 16-18

Data Base Design

A practical approach to the design, implementation, and maintenance of data base systems.

Effective data base system design requires both a complete knowledge of the facilities provided by a data base package, and a basic understanding of the mechanisms which can be employed to construct data base systems. In fact, the former is of questionable value without the latter.

This course is a package independent examination of the techniques required for the design of effective data base systems. The topics covered include:

- *Effective Record Design*
- *Physical Storage Techniques*
- *Optimum File Organization and Indexing Techniques*
- *File Integration*
- *and much more*

Given in association with Leo J. Cohen and Performance Development Corporation, this course reinforces the lecture material with workshops, in which attendees apply the techniques just learned, to practical problems.

You should attend this seminar if you are (or will be) involved in the design and/or implementation of a data base system and whether as a Data Base Designer, Planner or Analyst.

This course runs for 3 days and costs $350, including course materials, continental breakfasts and luncheons. Additional registrants from the same company qualify for a reduced rate of $300. Current schedule:

Los Angeles	Los Angeles Marriott	March 3-5
Chicago	Sheraton O'Hare Motel	May 12-14
New York	The Plaza	June 2-4

Contracting for Computers and EDP Support Services

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You should attend this seminar if you are involved in the purchase of EDP equipment or services, whether as a corporate counsel, contract administrator, DP manager, consultant or officer of a using firm.

Cost for the entire 2½ day seminar, including complete resource notebook, continental breakfasts, luncheons and coffee breaks is $295.00. The current schedule:

Chicago	Hyatt Regency O'Hare	February 26-28
Atlanta	Stouffers Atlanta Inn	April 23-25
New York	St. Moritz	June 4-6

Performance Evaluation and Improvement

A seminar actually designed to save your installation money.

This course starts with a discussion of questions and specific problems attendees have about system performance at their own installation. Then step by step each attendee will learn the methodology necessary to understand the problems and implement the answers. The techniques presented at this seminar are in effect at numerous installations today, and have extended the life of one S/360 for more than two years – a savings, at last estimate, of more than $700,000 for one user.

Our course leader is Saul Stimler. His book, *Data Processing Systems: their performance, evaluation, measurement, and improvement*, will be an important part of the seminar. As well as case studies, topics that will be covered include:

- *Criteria for quantifying performance*
- *Pencil and paper analysis of a system*
- *Benchmarking techniques*
- *Realtime, batch, and interactive time sharing systems*

You should attend this seminar if you are a data processing professional or corporate executive whose responsibility it is to plan, benchmark, evaluate, or improve data processing systems.

Cost for the entire seminar, including continental breakfasts, luncheons, and all course materials (including a copy of Saul Stimler's book on the subject) is only $250.

Current schedule:

New York **Waldorf-Astoria** **May 5-6**

Key-to-Storage Systems

How to evaluate and optimize the various successors to keypunch equipment.

Data entry is a big problem – and a big headache – as every computer user knows. It is therefore a prime target for cost savings. This course is designed to help you in the practical aspects of selecting, installing, and making the best use of keyboard-to-storage systems. It is an expansion and an update of our successful key-disk seminar. Under discussion (including some user case studies) will be:

- Introduction to data entry concepts (keypunch, buffered keypunch, keypunch, key-disk and beyond . . .)
- Key-disk hardware and software
- Evaluating . . . and starting . . . key-disk systems
- Selecting and operating intelligent terminals, both key-to-cassette and key-to-floppy disk
- Key-disk as a remote batch terminal
- Supervisor functions, motivation
- Mixed Media systems
- Trends in Computer Data Entry

This seminar is lead by Lawrence Feidelman, President of Management Information Corporation, and one of America's leading experts on data entry. All participants will receive a copy of "Data Entry Today", Management Information Corporation's authoritative publication on every aspect of data entry, including a six-month update of this continuing reference service.

You should attend this seminar if you are concerned with optimization of your data entry shop, and especially if you are considering or currently using key-to-storage systems more advanced than basic keypunch. Cost for the 3-day seminar is $350, including continental breakfasts, luncheons, and all course materials. Additional registrants from the same company are charged only $300.

New York	Waldorf Astoria	April 21-23
Chicago	Hyatt Regency O'Hare	June 9-11

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It's Not Easy...

Estimating Projects Crucial to Good Decision Making

By E. Drake Lundell Jr.
Of the CW Staff

One of the major keys in deciding between in-house program development and the purchase of outside software packages is the estimating process for in-house work.

And, even if the choice is not between an in-house program and an outside product, the estimating process is critical in keeping program development costs in line with expectations.

Unfortunately, "estimating is not an easy task," according to Auerbach's *Data Processing Manual*, which quickly added the task "is not impossible."

Typically, estimates in the past have been unsubstantiated guesses, according to the report, because "the validity of many estimates is influenced by the sheer desirability of the job to the estimator."

Because of this "new, prestigious assignments are almost always underestimated. The patch-up tasks that involve modification of old bread-and-butter applications are more often overestimated in the hope management will be discouraged from doing the jobs."

A formal, realistic job-estimating system is needed to avoid these problems, according to the report. Such a system, if it breaks out each element of cost for justification, will make it "more difficult for estimators to make large-scale mistakes," it added.

No Way to Be Positive

While "there is no way to be absolutely positive about estimates," the estimating process allows a firm to minimize its business risks by clearly identifying the resources required for the development of a system, Auerbach said.

The study noted the estimates do not have to be absolutely correct but should be ball-park figures to allow management to approve or disapprove a project on the basis of its potential return on investment.

But, in addition to their usefulness in the decision-making process, the estimates can also be used to provide a standard against which programmers and analysts can be measured and to "provide orderliness in the disorderly management process of systems implementation."

In addition, "without an estimate, there is no way to measure whether project costs have gotten out of hand," the report added.

To perform a proper estimate, "it is necessary to make a detailed study to identify the subsystems and cost elements; and it is necessary to define the requirements for various resources, such as manpower, computer time and cash," the publication suggested.

Typical Resources

All estimates should be written, Auerbach said, and typical resources that should be in the estimate include:

- Calendar days (work days) to complete.
- Man-days required to complete.
- Execution time of the final program or system.
- Storage requirements.
- File space.

At the same time, estimates should be made for each stage of the project, incorporating what is learned in the previous stages. Typical stages include preliminary analysis, systems analysis and design, systems implementation (including programming), system operation and evaluation.

"At each project stage, estimates must be made for all of the successor stages," Auerbach said, noting, however, "the further forward estimates are cast, the less reliable they are assumed to be."

At the same time, the publication noted "each new DP task is composed of some job elements that have been done before and some elements that haven't.

When these subparts of a project are identified, each should be analyzed to determine the resources that will be required to complete it.

Three Confidence Points

For each of these steps, the estimator should develop three different numbers: The most optimistic, the most realistic and the most pessimistic estimate.

"The most realistic estimate is the middle ground. In estimating, you are not saying a given job will require a specific amount of time; instead, you are saying there is equal probability you will use fewer than a given number of resources or more," the report said.

After all the subtasks have been identified, the resources needed for each named and the three estimates made for each, analysis can begin, the report noted.

'Astounding' Results

All of the results should be totaled, it said, adding "the results are likely to be astounding," because the totals will in most cases be higher than the inexperienced estimator would have guessed.

"This is the point at which many good estimates are ruined," the study warned.

"In an attempt to get the totals down to a preconceived region, the inexperienced estimator is tempted to 'tune' the larger resource requirements to affect the total. This is obviously bad practice."

Instead, the original estimate should be put aside, while the estimator takes a hard look at each of the figures once again, making revisions only to those items that appear to be incomplete or ill defined.

To make sure the estimates produced by this process are realistic, the estimating job should be done by the people who are going to do the work, the report added.

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2 Network Management
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Special Afternoon Sessions will continue to be open to all attendees.
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9:00 – 9:45	Introduction and Computerworld Report
10:00 – 11:15	Workshops – Phase I
11:15 – 11:30	Coffee Break
11:30 – 12:45	Workshops Repeated
1:00 – 2:00	Luncheon
2:15 – 3:00	Wrap-Up Panel

SPECIAL AFTERNOON SESSIONS
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It's easy to register for the Caravan.
Just use the form on this page to make your reservations for our Forum program. If you plan to attend only the Exposition, no advance registration is required. If you are not a Computerworld subscriber, you may want to write for a free guest ticket to the Exposition. (If you are a subscriber, we should be mailing you a free ticket automatically.) Just send your request to the person shown on the Forum Registration Form. And plan to be there when the Caravan comes to a city near you.

The '75 Caravan is coming to a city near you. Going your way is our way.

Atlanta Feb. 24-26 (Mon., Tues., Wed.)
Exposition: Atlanta Merchandise Mart, 240 Peachtree Street NE.
Forum: Hyatt Regency Atlanta, 265 Peachtree Street NE.

Phila. March 4-6 (Tues., Wed., Thurs.)
Exposition and Forum: Philadelphia Civic Center (Center Exhibition Hall) Civic Center Blvd. at 34th Street.

Hartf'd Mar. 11-13 (Tues., Wed., Thurs.)
Exposition: (and all registration) Hartford Civic Center, 190 Trumbull Street.
Forum: Sheraton Hartford Hotel, 196 Trumbull Street.

N.Y. March 18-20 (Tues., Wed., Thurs.)
Exposition and Forum: New York Coliseum (4th Floor), Columbus Circle.

Clev. April 1-3 (Tues., Wed., Thurs.)
Exposition and Forum: Cleveland Convention Center, 1220 E. Sixth Street.

Chicago April 8-10 (Tues., Wed., Thurs.)
Exposition and Forum: McCormick Place, On-The-Lake

St. Paul April 15-17 (Tues., Wed., Thurs.)
Exposition and Forum: St. Paul Civic Center, I.A. O'Shaughnessy Plaza

Seattle (Tues., Wed., Thurs.) April 29-May 1
Exposition and Forum: Seattle Center, 305 Harrison Street.

San Fran. May 6-8 (Tues., Wed., Thurs.)
Exposition and Forum: Hyatt Regency San Francisco, 5 Embarcadero Center.

FORUM REGISTRATION FORM

Advance Registration is not required for the Exposition.

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80 Education/Medicine/Law
85 Government – Federal/State/Local
90 Printing/Publishing/Other Communication Service
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32 Programmer/Methods Analyst
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70 Lawyer/Accountant
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90 Other:

Bits & Pieces

Peripherals General Offers Disk for Honeywell 400/600

CHERRY HILL, N.J. – The DSS 844/741 disk storage system from Peripherals General, Inc. can provide Honeywell 400 and 600 CPU users with 31.2M character/drive, the vendor said.

The DSS 844/741 is software- and hardware-compatible with the Honeywell 400/600 range and replaces the firm's earlier DSS 167 and DSS 180 lines, a spokesman said.

The drive system has a minimum access time of 7 msec and an average time of 20 msec. Latency times are 12.5 msec (minimum) and 25 msec (average).

Both a controller and one spindle can fit in a single five-foot rack, the vendor said.

The system controller costs $18,500 and the spindles $8,500 each from the firm at Cherry Hill Industrial Park, 08003.

COM Reader Allows Choice Of Six Magnification Ratios

CHICAGO – Bell & Howell's Spacemaster microfilm reader/printer offers users a choice of six quick-change magnification ratios as well as six different sizes of paper copy outputs, the firm stated.

Compatible with all popular jacket or microfiche forms, the reader/printer also makes positive paper prints from negative microfiche, the vendor noted.

The Spacemaster costs $920/mo from the firm at 6800 McCormick Road, 60645.

Built-in Vacuum Cleaner Helps DP Centers Keep Dust Down

GRAND RAPIDS, Mich. – Wal-Vac, Inc. has announced the availability of built-in cleaning systems for DP centers.

The systems can be used to remove dust from equipment as well as floor areas, the firm said. This includes removal of dust and paper from keyboard units, card readers and printers.

The system will not recirculate dust in the center, the firm added.

A system with power unit, accessories, piping and fittings and four "inlets" on the walls costs about $542. Wal-Vac is at 2851 Buchanan S.W., 49508.

Broomall Cuts Plotter Prices

PHILADELPHIA – The price of Broomall Industries' M2000 Magnetic Tape Incremental Plotting System has been cut to $24,800 from $26,500, the company said.

The firm's 2000 on-line plotter is now $10,500, compared with the previous price tag of $11,500.

Broomall is at 1716 Chestnut St., 19103.

With Dispersed Key-to-Disk System

Keystations Capture 35,000 Record/Mo

MIAMI – Although Florida International University (FIU) is barely three years old, it is growing rapidly. And at FIU, a regional university data center has just as rapidly outgrown its dependence on punched cards for data entry.

Officials at the university wanted flexibility in data entry and this included a need for data capture at special data entry stations outside of the data center; operation by nontechnical personnel in the various user departments, including unsupervised student-assistant keying; and overall user control.

One key-to-disk control unit and 11 keystations were installed to replace several IBM keypunches and verifiers. But only six of the keystations went to the data center; the other five units were installed in user departments located on different floors within the administration building.

With one keystation in the purchasing office, one in the registrar's office and three in the library, source data capture amounts to 35,000 record/mo or about 40% of the entire data preparation requirement at FIU.

DP Operation

In July 1972 a Univac 1106 computer (262K words) was installed at the data center to handle instructional, research and administrative processing for FIU and Florida Atlantic University in Boca Raton, which shares the data center with FIU.

Since that time, in addition to installation of an Inforex 1302 key-to-disk system, a time-sharing network has been expanded from 40 to more than 60 terminals. For time-sharing more than 60 DCT-1000 buffered terminals and U-100 CRTs with an average 2- to 5-second response time allow interactive processing for students and faculty. For remote batch, FIU uses a Univac 9200.

Six keystations located in the DP center enter 60% of Florida International University's data. The other five keystations are installed in user departments for source data capture of up to 35,000 record/mo.

Because of the relatively inexpensive tape transmission capability, Florida Atlantic University, uses two Data 200 terminals which transmit data 64 miles to the host computer over full-duplex leased lines. One of the Data 100 terminals is used primarily for administrative work, as well as sending data entered on the Inforex tapes. The other terminal is used for student and faculty batch processing.

The basic key-to-disk data entry system includes a shared processor control unit which contains the system disk and tape drive. Up to 18,000 records of 125 characters each can be stored on the disk before transfer to tape.

The control unit allows from one to 16 keystations to operate, simultaneously entering and verifying data in a foreground mode while a disk-to-tape transfer works in the background.

Standard functions include check digit insertion, batch balancing and balance accumulate and compare, with a number of special features including expanded tape processing, blocking and reformatting.

Accomplished Quickly

According to Jerry Edson, director of the regional data center, installation of the key-to-disk system was accomplished in an unusually short time, with actual cutover taking only one week.

"At the beginning," he said, "we simply used our existing card formats and experienced virtually no slowdown in our work. The only new element for our DP people was the keyboard, and that proved easy to master."

After a year in operation, Dennis Klinger, the data center's associate director at FIU, feels the decision to put data entry terminals directly in the departments with the heaviest flow of source data input has proven to be fully justified.

"The system works," he said, "because people with no data entry experience at all can use the equipment with only a minimum of training. It's easy to use and they love it.

"The users have told me there's just no way they'll let me move their stations back to the data entry area. In fact, one girl in the library learned to operate the system and taught everyone else in the department how to use it in just a few hours."

In order to make the data entry terminals easily usable by non-DP personnel, especially the student assistants, the Inforex prompting feature has been incor-

(Continued on Page 32)

Three Scan-Optics OCR Readers Give Range of Price and Power

EAST HARTFORD, Conn. – Scan Optics, Inc. has introduced three optical character readers.

The Systems 540, 530 and 510 operate off-line to magnetic tape and offer optical features such as journal tape reading and off-line print station capability.

System 540 is a high-speed page/document reader designed for data input environments with a variety of pages and documents to be processed, the firm said. Data may be read from forms 4-1/2 in. by 3 in. minimum to a 9-in. by 14-in. maximum size.

It processes 8-1/2-in. by 11-in. pages with 30 lines of data at 50 page/min; small documents with one line of data are processed at up to 500 page/min.

System 530 is designed for processing of large volumes of turnaround documents. It processes documents from 3-in. by 2-1/4-in. to 9-in. by 6-in. at up to 500 document/min.

Both the 540 and 530 utilize the image dissector tube technology which provides the capability of scanning at up to 2,000 char./sec, the company said.

System 510 is designed for low-volume data input environments that require processing both pages and documents. This system, a laser scanner, processes up to 55 document/min or up to 8 full pages per minute.

Monthly lease prices for the 540 and 530 range from $4,300 to $7,000, depending upon configuration. System 510 ranges in price from $1,750/mo to $3,000/mo.

The company is at 22 Prestige Park, 06108.

Yes.

If you can answer "yes" to this question, we'll send you a free metric/inch converter.

Does your company purchase minicomputer/miniperipheral hardware and add value to produce a system for resale?

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COMPUTERWORLD

Keystations Capture 35,000 Record/Mo

(Continued from Page 31)

porated into the system, enabling the operator to respond directly to fill-in-the-blanks displays which appear on the CRT.

"The job formats stored in the data entry control unit that use the prompting feature lead those unfamiliar with data entry faster and more easily through the entry procedure with system-generated prompting messages," Klinger said.

"The prompting feature enables users to concentrate on their own jobs, without having to learn many complicated new procedures. There's no question that this feature really makes the whole concept of distributed data entry workable."

Distributed Data Entry

Because the system was so easy to learn, other departments at FIU are considering distributed data entry rather than expensive on-line terminals.

As the FIU program now stands, four different data preparation areas are working in four very different groups of applications. According to Klinger, "With the data entry system, each user can better control the data being entered and therefore rely to a greater degree than before on their computer-generated reports. The user is more involved, resulting in a truly functional flow of data to the computer."

In the data processing area, where 60% of the data preparation function continues, key entry equipment is used in accounting, receivables, payroll and inventory control. During peak periods, such as September and January, the department assists in registration inputs.

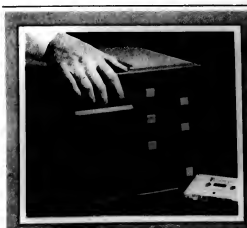
The purchasing department has completely automated its accounting system with the help of key-to-disk equipment. Moving from multipart, typed purchase orders to Inforex-generated requests for computer-printed purchase orders, the department has doubled its speed over typing.

The admissions department is the first step in compiling a student data base of vital information. The keystation in this department helps process up to 1,500 admission applications per week during peak periods. It is also used to update and change student information, as necessary, and assist in preregistration processing.

With the keystation in the department, student records never leave the registrar's office.

The library at FIU uses three keystations in different areas to enter data for the acquisition, serials and collection development groups. The data center, in turn, provides reports, purchase orders and control records on circulation, acquisitions and serial holdings for daily library control.

With over 135,000 volumes, numerous maps, microfilm, newspapers, government documents and multimedia resources and over 4,000 journals and serials, the library presented the strongest case for distributed data entry.



Ten 'Off-the-Shelf' Systems Track Army Materiel

WASHINGTON, D.C. – Some 2.8 million tons of equipment and supplies, required to maintain the U.S. Army, move in and out of the Army Materiel Command's (AMC) 14 supply depots.

To keep track of this movement, service and maintain equipment, forecast supply needs and provide civilian payroll and other records for the 50,000 military and civilian employees, the Army uses 10 "off-the-shelf" Control Data Corp. (CDC) 3300 business data systems.

The total system, (Speedex) System-wide Project for Electronic Equipment at Depots provides an ability to interact directly with the computer from the points where work is being accomplished, through use of remote data entry/display terminals at the major work sites within each depot.

AMC's goals in establishing the system were use of multiprogramming techniques for increased throughput, use of disk devices as replacements for magnetic tape and punched cards and greater use of remote terminals at the point of work, it said.

The result is a system that provides real-time retrieval of operational and management information in which the outputs of one program become the inputs to the next program sequence, greatly reducing dependency upon magnetic tape and minimizing the use of punched cards, according to AMC.

With most information stored on immediately accessible disk files, increased use can be made of remote terminals as interrogation devices to provide most of the data required to manage the logistics and depot support functions.

One major application of Speedex is to process data generated by the depot supply distribution system. As incoming material enters the warehouse conveyer system, it is identified, classified and recorded in the computer through use of CRT terminals. Location of incoming materiel, stock number and quantity verification are received by querying the computer through the CRT keyboard.

Speedex then generates the printed documentation to accompany the materiel into storage or ultimate disposition and transmits the record of receipt to the proper inventory control point.

The installation supply accounting system obtains repair parts and supplies for all depot activities. Among other data, this system provides actual order and ship times by item, prints out releases for back orders upon receipt of materiel in the warehouse, records transactions in general ledgers and generates billings.

The system also maintains a procurement history of locally purchased items. Vendors' lists are consulted by the computer, which then prepares a purchase request and provides supply and financial data.

The management information system matches materiel costs with the correct job or activity. This data assists production planning and control personnel in tracking costs of repair parts and labor.

The system also prints out warning notices where the usage is outside established parameters and calls management attention to those work centers where production is above or below expected norms.

In serving the depot maintenance function, a typical application example is that of development of a mathematical scheduling model for the production planning and control system.

This system matches job requirements – such as normal and critical repair cycle times, work center routing data, priority and scheduled delivery dates – with job status and resources available to complete the job.

Based on this data, the computer assigns priorities to all jobs that are in process or awaiting scheduling into the various work centers. Then the computer begins to load each work center by job priority until all available man hours are scheduled.

All jobs that should have been completed will appear at the end of each day as ready to be sent to the next work-station or into inventory or scheduled for shipment.

By-products of this simulation are shop schedules as well as detection of possible problems which may occur in processing critical items.

Eight Channels

In a Speedex installation, the CDC 3300 CPU is served by a core memory of 192K, 24-bit words.

Eight communications channels tie the processor into the peripheral equipment, which consists of:

- Four 607 tape drives (150 in./sec, 800 bit/in.).
- One 501 (1,200 line/min) printer and one 512 (1,200 line/min) printer.
- One 415 2,500 card/min punch and a 405 1,200 card/min reader.
- Three or more 841-8s and one or more 814 disk files.

Up to 13 groups of remote terminals are tied into this configuration with a special designed front end. These remote terminals range from a single CRT to a more standard configuration employing CRTs, console typewriters, line printers, card readers and card punches.

Speedex is controlled by a variation of Master, the basic operating system for all CDC 3000 series computers. Called Master V4.0, this modification has enhanced the system's ability to process a number of jobs simultaneously, thus increasing system throughput, AMC said.

Micro Design Reader Eliminates Fan Need

HARTFORD, Wis. – Convection cooling that eliminates the need for a fan makes the COM 150F microfiche reader suited for quiet offices, according to its vendor, Micro Design, Inc.

The reader has an 11-in.-wide by 8-in.-high screen and uses drop-in lenses with magnifications from 18x to 54x.

The COM 150F costs $1187 from the firm at 857 W. State St., 53027.

Diskettes Cost $7.25

SANTA CLARA, Calif. – Dysan Corp. has brought out a series of floppy diskettes, including three IBM-compatible versions and three hard-sectored versions.

The IBM-compatible versions are the Dysan 3740, 3600 and S/32. The hard-sectored versions include the Dysan FD/1V (32 sectors, 1 index, outside diameter); the Dysan 101 (32 sectors, 1 index, inside diameter); and the Dysan 110 (8 sectors, 1 index, outside diameter).

The IBM-compatible diskettes cost $7.25 each and the hard-sectored diskettes costs $8 each from the firm at 2388 Walsh Ave., 95050.

How Gordons Transports Keeps On Trucking To Atlanta:

INCOTERM®

Gordons Transports, Inc., provides direct, one-line shipping service between Atlanta, Georgia, and 800 other towns and cities throughout the Central and Southern United States. Gordons serves 15 major traffic corridors from Dallas to Minneapolis, from New Orleans to Cleveland. The Gordons fleet numbers over 2500 modern line-haul and city units.

And Gordons Transports' computer network features INCOTERM Intelligent CRT Terminals throughout the system.

It's no small job. Input is complex and varied: freight bills, manifests, delivery reports, dispatch and arrival data, real-time departures of line-haul equipment, each move of every Gordons city unit, and inquiries about the location and status of shipments and equipment.

INCOTERM tells Gordons which unit picked up which shipments, by number, from which customers. It tells the name of the driver, who loaded each shipment, who transferred it from city to line-haul equipment, who unloaded it... and whether there were any overages, shortages or damage.

INCOTERM helps guarantee that hazardous materials are treated with respect, that todo freight is never carried in combination with shipments of food, and that the rigorous and complex regulations of each city, state and the Department of Transportation are observed to the letter.

And INCOTERM provides access to the most advanced computer-assisted rating system in the trucking industry—developed by Gordons on INCOTERM equipment.

INCOTERM provides remote control and data concentration at both 2400 and 4800 baud. The result is greater power, versatility, efficiency—and longer system life—than Gordons found was available with any other equipment.

All kinds of other users have made the same discovery.

Like Gordons Transports, we deliver.

INCOTERM: More Power To Your Terminal.

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With INCOTERM customer service and sales offices in major cities throughout the United States and abroad.

Burroughs B2700 Links 36 Stations

On-Line Tellers System Saves Money, Time, People

By Vernon R. Wilson
Special to Computerworld

As recently as June 1, 1973, City National Bank of Tuscaloosa had no teller machines of any type in its main office or five branches.

But, by the following November, the bank had converted to an on-line tellers' system for demand deposits, savings and loans and had also installed an on-line "24-hour teller" at one branch.

There are now 36 Burroughs TU500 tellers' machines on-line in the branches and main office linked to a 150K Burroughs B2700 mainframe and 32M bytes of disk storage.

The B2700 processes an average of seven jobs at once, and the bank runs about 25,000 demand deposit items, 1,000 savings items and 1,500 loan items each day.

Despite the radical nature of its conversion to an on-line system, the bank had no problems with equipment or programs and only minimal problems in personnel retraining.

Somewhat surprisingly, too, the cost of the entire in-house system, including DP salaries and rentals, is only slightly more than the $12,000/mo we once paid a service bureau just to run demand deposit accounting, installment and our own payroll.

The terminals we purchased are additional. But their cost is far outweighed by the savings we have encountered.

The On-Line Approach

The on-line approach makes teller operations much faster and more accurate, which is important because some of our tellers handle more than 500 transaction/day. Customer service is speeded and broadened, and customer relations improved.

Items are sent to the proof department faster, and balancing is quicker at the end of the day. Controls are tightened, and an increase in overall operating efficiency is having a favorable effect on the bottom line.

City National is a $95-million bank with a total of 139 employees, 20 of whom are part-time. Counting them as half-time workers, we have just 1.35 employees per million dollars.

During a typical recent work week, these people put in only 62 hours of overtime.

'People Savings'

The new system insures continuing "people savings," which come primarily from not having to add workers in proportion to increases in volume. For example, in 1959, we had 7,200 demand deposit accounts that required the services of more than 20 people in bookkeeping and two in proof and transit.

We still have 20 in bookkeeping, plus six in DP and six in proof and transmit because of additional encoding -- but we now have 23,000 demand deposit accounts.

The bank has enjoyed comparable increases in savings accounts, yet processing pressures are declining.

Other savings from the on-line system include a reduction in losses due to bad checks, especially those under $25, which we didn't verify in the past. Now all "on-us" checks are verified when they are keyed into the tellers' machines.

In the past, to verify a check, the teller had to turn his back on the customer and phone bookkeeping. This was slow, and especially bad if the customer had been with us for years and had substantial funds in his account.

Stop payments are handled so that if a check for the exact amount of the stop payment is presented to any teller, a red "alert" light glows on the terminal when he keys in the amount.

The teller depresses a button and the terminal types out the reason for the alert. Then, the teller can inquire further into the status of the account if he wishes.

The teller can also find out available balance, balance at the start of the day, date of last deposit, amount of the last deposit, type of account, officer assigned to the account, branch where it was opened, etc.

Consequently, tellers don't have to call bookkeeping constantly, as they once did, and this frees lines there to handle inquiries from customers.

Further, our responses to these inquiries are based on current information and come much more quickly than in the past, since the bookkeeping staff gets its information from a Burroughs TD700 display linked to the computer.

We even have a copy of the customer's statement on-line which bookkeeping can display. If the customer wants a copy, the clerk at the terminal can immediately output it on a printer.

Paper Costs Down

The bank's paper costs are also down substantially. We only print a full trial balance once a week, and run an activity trial the other four days.

Also, we formerly used duplicate cash tickets that cost $4/thousand. We have now switched to single cash-in, cash-out tickets at 90 cents/thousand.

At present in our on-line system, we just decrease demand deposit and savings balances by the amount of withdrawals, in a memo-posting operation, although a customer can request a cash deposit during the day update his account.

But we will soon begin increasing balances with deposits and plan a selective updating system. We now do a full update each night.

We are also planning a Total Information System, using standard Burroughs software and adding several display terminals for our loan officers, marketing personnel and top management.

On the agenda, too, is automation of our general ledger. Commercial loans is under study right now. Thus, everything will be on except trust.

One factor: we feel we have been able to get by with a small DP staff because we use our mainframe vendor's financial application programs, which we modified to meet the bank's needs.

The staff includes DP Officer George A. Wilson and his assistant -- both of whom can program -- plus one programmer, two computer operators and a keypunch operator.

Wilson is executive vice president and cashier, City National Bank of Tuscaloosa, Ala.

3330 plug-compatible disk drives from Randolph

RCC/7330 disk drives provide IBM S/360 and IBM S/370 users with high performance at savings of 30% or more

Over eight thousand Model 7330 disk drives are running round-the-clock on S/360/50, 65 and S/370's throughout the U.S. They match the performance of IBM 3330 disk drives in every vital comparison except one—price.

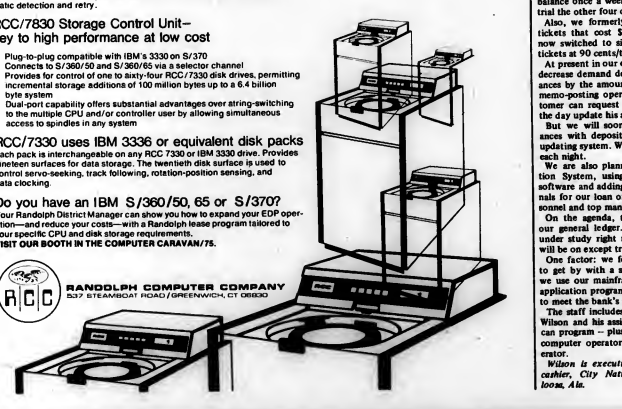
The RCC/7330 disk drives offer Randolph customers saving of 30% or more, and you still get the same Storage Capacity of 100 million bytes per spindle, Transfer Rate of 806,000 bytes per second and Error Correction with automatic detection and retry.

RCC/7830 Storage Control Unit—
key to high performance at low cost

- Plug-to-plug compatible with IBM's 3330 on S/370
- Connects to S/360/50 and S/360/65 via a selector channel
- Provides for control of one to sixty-four RCC/7330 disk drives, permitting incremental storage additions of 100 million bytes up to a 6.4 billion byte system
- Dual-port capability offers substantial advantages over string-switching to the multiple CPU and/or controller user by allowing simultaneous access to spindles in any system

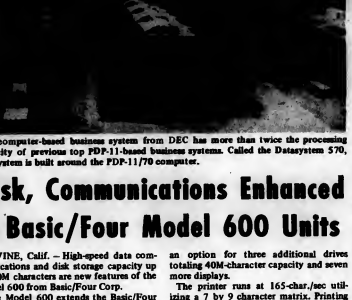
RCC/7330 uses IBM 3336 or equivalent disk packs
Each pack is interchangeable on any RCC 7330 or IBM 3330 drive. Provides nineteen surfaces for data storage. The twentieth disk surface is used to control servo-seeking, track following, rotation-position sensing, and data clocking.

Do you have an IBM S/360/50, 65 or S/370?
Your Randolph District Manager can show you how to expand your EDP operation—and reduce your costs—with a Randolph lease program tailored to your specific CPU and disk storage requirements.
VISIT OUR BOOTH IN THE COMPUTER CARAVAN/75.



RCC RANDOLPH COMPUTER COMPANY
537 STEAMBOAT ROAD / GREENWICH, CT 06830

MINIWORLD



The computer-based business system from DEC has more than twice the processing capacity of previous top PDP-11-based business systems. Called the Datasystem 570, the system is built around the PDP-11/70 computer.

11/70 Similar to 11/45 But Features More Speed

By Vic Farmer
Of the CW Staff

MAYNARD, Mass. – Digital Equipment Corp. has finally announced its long-touted PDP-11/70 which, although not a 32-bit mini, does have 32-bit internal data paths.

The 11/70 is just a couple of steps away from a true 32-bit machine – and speculation continues that the firm may eventually add 32-bit registers and a 32-bit memory – once it solves software compatibility problems with its 16-bit machines.

But the 11/70 announcement was, nevertheless, loaded with modifications that add up to a solid advance in its PDP-11 range. DEC spokesmen claimed the integration of cache memory and memory management capability (up to 2M bytes of core) into the standard PDP-11/45 CPU will give users two to three times the throughput of the PDP-11/45.

In terms of price of comparable configurations, a PDP-11/45 with 256K costs $65,000 while an 11/70 goes for $68,800.

Integration of memory mapping into the CPU eliminates the 90 nsec overhead problem of the scheme on the 11/45 and provides up to four times the directly accessible memory (256K bytes to 1M bytes).

While the cycle time for the central processor itself is the same as the 11/45, the utilization of the bipolar cache memory of 2K bytes is said to give a total effective cycle time of under 400 nsec.

DEC claimed that in benchmarks the hit ratio of needed data being in the cache memory was over 90%. The cache memory gives the basic performance of a completely semiconductor memory but allows DEC to use the "less expensive but more stable core," the firm said.

Checks on Cache

Whenever a request is made to fetch data from memory, the CPU checks to see if the data is in cache. If it is, it is fetched from cache and no main memory read is required.

If not in cache, four bytes are transferred in parallel from main memory for execution. When a request is made to write data into main memory, it is written into both the cache and main memory, DEC said.

In addition to having a slightly slower Unibus than the 11/45, the 11/70 has a 32-bit higher speed data path between the cache memory, main memory and four optional high-speed and integrated, peripheral controllers.

For more information on the software for DEC's PDP-11/70, see related story on Page 19.

These controllers are intended basically to handle 88M byte/spindle disk pack subsystems, a 1.2M byte fixed-head disk and 1,600 bit/in. tape drives.

All previous PDP-11 peripherals are available.

Parity Errors

Byte parity generation and checking is used on address as well as data transfers between main memory, cache memory, each peripheral controller and many peripheral devices, according to DEC. Parity errors are detected, the location recorded, and the system traps to a given location where a software routine may be executed to take whatever action is deemed appropriate for the individual installation, DEC said.

One parity bit per 8-bit byte is standard.

The integrated memory management processor is said to support hardware partitioning and operating mode protections. Multiple partitions can be protected for each of the system's three operating modes.

For removable media such as disk cartridges or tapes, volume protection allows a volume to be write-protected so the data cannot be inadvertently disturbed.

Floating-Point Processor

An optional floating-point processor is available to increase speed. It plugs directly into the PDP-11/70 CPU and works in parallel with the basic arithmetic and logical circuitry of the central processor.

The floating-point processor has its own set of six 64-bit accumulators. Calculations are carried out in single precision (32-bits) or double precision (64-bits); data formats provide seven decimal digits accuracy in single precision, 17 decimal digits accuracy in double precision.

As much as 75% of floating-point processor execution time may be overlapped with nonfloating-point central processor operations. Two double-precision floating-point numbers can be multiplied, using a single instruction, in 9 µsec, according to DEC.

Packaged Business System

DEC has incorporated the 11/70 into a packaged business system, the Datasystem 570, with twice the capacity of the previous top member of the line.

The 570 is an on-line, multiterminal system; up to 63 users can operate system terminals simultaneously, DEC claimed.

The system employs an enhanced version of DEC's commercial time-sharing system, CTS 500/E.

(Continued on Page 36)

Disk, Communications Enhanced In Basic/Four Model 600 Units

IRVINE, Calif. – High-speed data communications and disk storage capacity up to 40M characters are new features of the Model 600 from Basic/Four Corp.

The Model 600 extends the Basic/Four line to remote interactive multiterminal systems.

The system incorporates a programming language called Business Basic II, an enhanced version of Business Basic with improved file handling capability, the company said.

An "intelligent" disk controller is microprocessor programmed for distributive processing and provides for associative addressing, in which data is retrieved by reading the data content of the disk rather than searching for an address that must be called out in the programming, the company added.

The result is said to be greater processing efficiency and higher throughput.

Synchronous Communications

In addition to asynchronous communications, the Model 600 includes a controller for synchronous communications that handles a subset of bisynchronous transmission over a leased or dial-up line at normal voice rates.

This feature enables direct communications between the Model 600 and central processors of other manufacturers. The Basic/Four unit can operate as a stand-alone business system or as a multiterminal-interactive front-end processor for a large computer facility, the firm said.

The standard Model 600 includes a CPU, video display terminal, a 10M-character disk drive and 12K of memory, with an option for three additional drives totaling 40M-character capacity and seven more displays.

The printer runs at 165-char./sec utilizing a 7 by 9 character matrix. Printing speed is 60 132-character line/min. Higher speed printers are available.

Eight Terminals

The Model 600 operates up to eight interactive terminals concurrently, the company said. Interactive stations include the Video Display Terminal (VDT) and the Executive Display Terminal (EDT).

The VDT is suited for inquiry handling and high-volume data entry applications. The VDT operator may verify and/or correct source data at the entry point.

Price for the standard Model 600 is $54,400. Deliveries are scheduled for the third quarter from the firm at 18552 MacArthur Blvd., 92707.

From GRI Computer

System Uses Interactive RPG-II

NEWTON, Mass. – A minicomputer-based small business system from GRI Computer Corp. uses RPG-II programming and is said to be designed for application in a real-time, interactive, multiuser environment.

The basic system, priced at $41,750, consists of the 99/50 CPU, a disk subsystem with one fixed and one removable disk, a medium-speed printer and one or more CRT terminals.

The CPU is equipped with 16K (16-bit) words of core memory, a direct memory access channel and interfaces to all peripherals.

Core is expandable up to 32K, GRI said. Minimum/maximum disk storage for the system ranges from one to four drives of 5.3M bytes or 10.6M bytes each.

Average access time is 35 msec, according to the firm. The printer is capable of printing 132 column lines at 165 char./sec.

The CRT terminal has a fully buffered keyboard modified with oversized ENTER command pads to facilitate data entry, the firm said. Screen capacity is 8 or 16 lines of 80 characters.

Additional terminals can be added for simultaneous, multiuser data entry.

The system 99 supports RPG-II, modified by GRI to Interactive RPG II, for a real-time, multiuser, business-oriented environment, the vendor said.

The system permits any combination of Interactive RPG-II programs, assembly language programs and system utilities to be run concurrently (up to system memory capacity) through an interrupt-driven scheme, the firm said.

Thus, multiple users can perform a range of identical or different simultaneous tasks like data-entry, update and retrieval functions by sharing the system resources.

Optional peripherals available include multiple terminals and printers as well as batch-processing peripherals such as 80- and 96-column card equipment and magnetic tape stations.

The system will be marketed through 22 distributors. GRI is at 320 Needham St., 02164.

NCR 299 Gets Communications

DAYTON, Ohio – NCR's recently announced 299-0200 accounting computer offers expanded memory, cassette input/output and communications abilities.

The cassette and communications capabilities will provide data capture and operations in an off-line, on-line or remote batch communications environment plus faster program loading, according to NCR.

The multipurpose system can accommodate up to 126 program steps and 100 totals. The first model of the 299, introduced a year ago, provides a maximum of 63 program steps and 50 totals.

In a communications environment, the newer system can edit, format and validate data for transmission in 7-bit Ascii to a central computer.

A communications adapter is slated to be available to interface with IBM equipment later this year.

Data received from a central computer can be formatted and reports prepared by the 299.

The magnetic tape cassette feature offers an economical means to store application programs and operational data. It also provides high-speed program loading, according to the firm.

Programs can also be entered using the 299's optical scanner, which reads instructions in the form of pen or pencil marks on a program assembly card and enters the information into the processor's memory.

Data can be written on a cassette as an automatic by-product of an accounting application. The captured data can be reentered into the system later for processing by another application or transfer to a central computer.

The basic version of the 299-0200 system, which includes 50 totals and 63 program steps plus firmware for the optional features, rents for $310/mo. It can be purchased for $9,300.

Options which can be added at the customer's place of business include additional memory, multiply/divide and check digit verification features, a continuous forms feeder, data cassette input/output recorder and communications, NCR said.

LSI-11 Executes 11/40 Instruction Set at 11/05 Speed

MARLBOROUGH, Mass. – Digital Equipment Corp. has unveiled its LSI-11 microcomputer, which can be configured as a functional computer system on a single board or as a total system with up to seven modules and a backplane.

The LSI-11 executes the 400-plus instruction set of the PDP-11/40 at speeds comparable with the PDP-11/05, DEC said.

It provides the software compatibility for future expansion in the PDP-11 family. One to 49 units are priced at $990 each; 40 to 90 units, $653 each; over 100 units cost $634 each.

The LSI-11 includes a microcomputer module with integral 4K of 16-bit memory, two I/O units and four expansion memory modules. These modules can be interconnected through a backplane assembly in various combinations, DEC said.

The KD11-F microcomputer is a standard 8-1/2-in. by 10-in. module which incorporates an LSI N-channel MOS CPU chip set. The chip set includes one 40-pin control chip, one 40-pin data chip and two 40-pin microcoded read-only memories (ROM) or microms.

The microms contain the instructions to execute the PDP-11/40 instruction set, implement an on-line debugging package and bootstrap, as well as execute an Ascii console routine which permits all manual interactions through standard local or remote serial line terminals, DEC explained.

A fifth socket is included on the module to accommodate optional hardwsre fixed- and floating-point arithmetic instructions. These instructions include the extended instruction set option which performs hardware fixed-point arithmetic and allows direct implementation of multiplication, division and multiple shifting.

The floating-point instruction set option executes four special instructions for floating-point addition, subtraction, multiplication and division.

The microcomputer module also includes a 4K by 16-bit MOS random access memory (RAM), a real-time clock input, a direct memory access bus, logic for a single level of vectored priority interrupt, and power-fail/auto-restart. Processor I/O functions are performed over a 16-bit asynchronous parallel bidirectional bus.

The DLV11 serial line I/O module provides standard 20mA current-loop or EIA interfaces. Transmission rates are jumper-selectable from 50- to 9,600 bit/sec, and protocol stop bits and data bits can be matched to user requirements by means of jumper connections, DEC said.

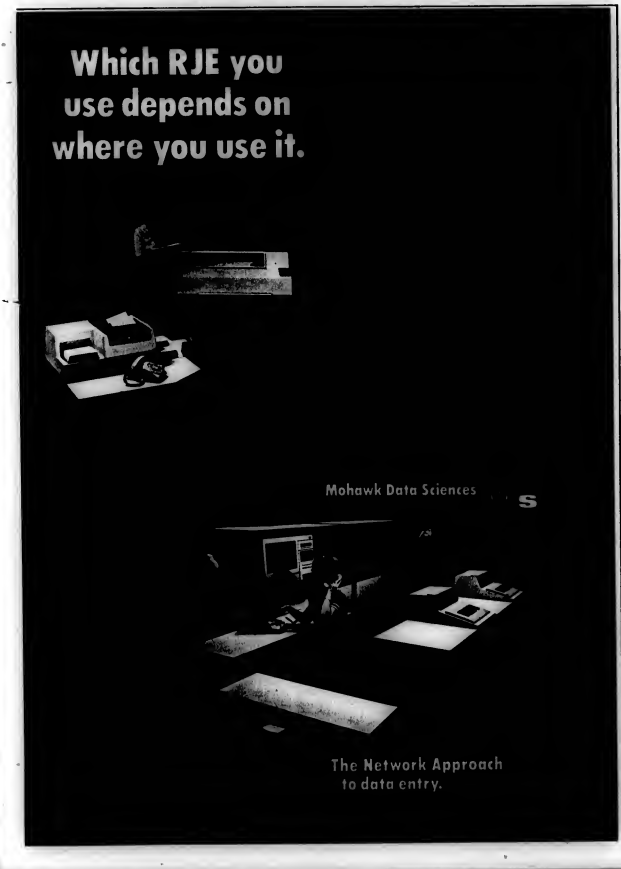
The DRV11 parallel line I/O module is a general purpose 16-bit parallel interface between the LSI-11 bus and the user's peripheral devices. Both interfaces are PDP-11 compatible.

Expansion Memory Modules

In addition to the 4K RAM on the microcomputer module, the LSI-11 is offered with four expansion memory modules. A maximum of 4K fusible-link once-programmable read-only memory (Prom) is available which has sockets to use either fusible-link Prom or masked ROM. It can be implemented in blocks of 256 or 512 words.

Read-write memories include a 4K core module, a 1K static RAM and a 4K dynamic RAM. The 4K dynamic RAM sells for $400 in quantities of 100, as an example of memory price.

Like all previous PDP-11s, the LSI-11 can be programmed directly with standard PDP-11 software. Programs include assemblers, linkers, editors, loaders, utility packages, operating systems and higher level languages, DEC said.



PDP-11/70 Faster Than PDP-11/45

(Continued from Page 35)

Languages currently supported by this operating system are Basic Plus and batch Cobol.

Programs written in PDP-11 Cobol, a subset of Anti 1974 Cobol, may be compiled and executed in the batch mode as a background program as other, interactive programs are executed in the foreground, DEC said.

Prices for 570 configurations range from $130,000 to $250,000. Deliveries are scheduled for late summer.

A typical 570 configuration, consisting of a PDP-11/70 with 192K bytes of main memory, a 1,600 bit/in. tape drive, a disk drive with a capacity of 88M bytes, a 300 line/min printer and 10 on-line terminals, would rent for approximately $5,700/mo at current five-year lease rates, including maintenance.

Memory expansion capability is limited to 1.5M bytes in the Datasystem configuration.

Centronics 588 Printer Runs at 88 Char./Sec

HUDSON, N.H. – The Model 588 impact printer from Centronics Corp. is said to operate at 88 char./sec across 132 columns.

A variety of minicomputer interfaces are available, the firm stated.

The standard 64-character Ascii set can be increased to 96 or 128 characters. About 20 foreign language, scientific, upper/lower case and other special characters sets are available.

The Model 588 costs $2,560 from the firm at 03051.

Mini-Based System 'Mixes It Up' In Paint Manufacturer's Center

CHICAGO – A mini-based system is playing a key role in the development and manufacture of paints at the Sherwin-Williams Co.

Development and technical service specialists at the firm's A.W. Steudel Technical Center are using a Hewlett-Packard (HP) 3000 in the development of new paint formulations and for color matching of paints during manufacture.

The system currently includes eight terminals at the Steudel Center and one terminal at a nearby Sherwin-Williams subsidiary.

Don W. Parker, manager of color and computer services at the Steudel Center, said the paint-formulating software used with the mini has improved the speed and accuracy of product development and is helping Sherwin-Williams find effective substitutes for raw materials in short supply.

Multitude of Characteristics

By combining different types and quantities of pigments, resins and solvents, Parker explained, formulators can adjust and control the multifude of characteristics that must be considered in designing a paint product.

Besides the application properties of the paint and the physical characteristics of its dry film, such things as heavy metal content (which may be constrained by federal, state and local health codes) and solvent emission characteristics (certain solvents and the amounts that are used may be restricted by similar codes) must be known and controlled within allowable levels.

Sherwin-Williams' formulating software determines such characteristics by simulating the behavior of paint formulations. This is a powerful tool not only for researching new products, Parker observed, but also for maintaining existing commercial formulations in the face of materials shortages.

For example, Sherwin-Williams will use the HP 3000 to predict what can be expected if a solvent in short supply is replaced by one more readily available.

And if the substitute solvent isn't exactly interchangeable with the original one, it can determine how the other components in the formulation must be changed to accommodate the substitution.

Using this predictive software in conjunction with cost-minimizing linear programs, the system is able to determine the least-cost formula that will yield specified product performance.

Miniworld At Large

Dutch Scientists, Aided by Nova 1200, Study Flies' Eyes

GRONINGEN, The Netherlands – Scientists here are serious and amiable people, but one can hardly say they wouldn't hurt a fly, for the subject of their research is the action of a fly's eye.

Seeing can be defined as the assimilation of visual information. The retina of the human eye receives the image observed through only one lens, but insects' eyes are equipped with a large number of lenses.

The retina consists of a number of sense organs, in which light absorption is the start of the visual process. In the retina, the light is transformed into electrical waves. The nervous system, which receives these waves, codes them into short pulses or "spikes."

These spikes are generated at random discrete time intervals. By means of microelectrodes implanted in the "optical" part of the nervous system of the fly, this sequence of spikes can be sensed, digitized and input to the Data General Nova 1200 computer used in the program.

On-line determination of the statistical properties of the spike trains gives the research team the tool to look at the relationship between the recorded spike train and different kinds of light stimulation of the retina.

The aim of the researchers is to learn how information is processed by the retina. The Nova 1200 has 24K of core memory and a disk drive, programmed in Fortran IV under a real-time disk operating system (RDOS).

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The basic configuration includes 16K bytes of memory, CRT/keyboard, 100 CPS printer and 5 million byte disk. Furthermore, System III is easily expandable without a lot of hidden cost.

And what's probably most important to you and your customers: the cost of a typical System III can be substantially less than the cost of competing systems.

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Versatec Unit Cuts Hard-Copy Costs 25%

CUPERTINO, Calif. – Tektronix display terminal users can get hard copy at one-fourth the cost of dry silver paper through use of the Versatec C-Tek controller and either of two standard electrostatic plotters, Versatec said.

Electrographic paper used in the processes costs one-fourth as much as dry silver paper. The copy does not fade or deteriorate with time, Versatec added. Transfer time is approximately 12 seconds.

The C-Tek controller, contained on a single printed circuit board mounted in the electrostatic plotter, is mechanically and electrically compatible with Tektronix 4000 series displays (models 4010, 4012, 4013, 4014 and 4015). It emulates the Tektronix 4610 hard-copy unit.

One controller accepts input from up to four Tektronix display terminals.

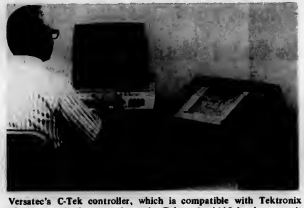
The C-Tek controller is used with Versatec D1100A or D1110A printer/plotters. The D1100A has an asynchronous print speed of 500 line/min and asynchronous plot speed of 1.2 in./sec.

The D1110A operates at twice the print and plot speed (1000 line/min. and 2.4 in./sec).

Both units use a 7 by 9 character matrix with resolution of 100 dot/in. Both print full 132 columns on 11-in. paper, using a standard Ascii 64 character set (96 to 128 character sets are optional).

With Versatec-supplied interfaces, the units can be used as on-line computer printer/plotters when not in use with the Tektronix display.

The C-Tek controller costs $950 from the firm at 10100 Bubb Road, 95014.



Versatec's C-Tek controller, which is compatible with Tektronix 4000 series displays, emulates the Tektronix 4610 hard-copy unit and accepts input from up to four display terminals.

General Robotics Adds Systems, On-Site Training

WEST BEND, Wisc. – General Robotics Corp. has introduced the Video/8 single-user computer system and the Robot 8, a multiuser virtual OS/8 time-sharing system.

The Video/8 is based on an 8K Digital Equipment Corp. PDP-8 and also includes a 24-line CRT console, dual floppy disk, 165 char./sec line printer, accessories, software, supplies delivery, installation and on-site seminar.

The system costs $19,950, with maintenance at $275/mo.

A three-user Robot 8 includes a 16K DEC CPU, three CRTs, triple floppy disk and line printer in addition to software, accessories and services.

The time-sharing system costs $29,500 with maintenance at $395/mo.

General Robotics will develop application programs for users on contract and will also customize its training to suit user needs, a spokesman said.

The company has maintenance centers in Wallingford, Conn. and Chicago, the spokesman said. Maintenance contract prices are for systems installed within 50 miles of a service center.

For additional travel, a charge of $25 per 50 miles is added in.

General Robotics Corp. is at Post Office Box 853, 53095.

Controller Links Wangco Drives

ELMSFORD, N.Y. – Wangco Model 10, 11 and 11A 1/2-in. tape drives can be interfaced to Digital Equipment Corp. PDP-11 and Data General (DG) minicomputers with a controller system from Mini-Computer Systems, Inc.

Mini-Computer Systems will provide the controller, which takes up one CPU slot, plus the Wangco formatter and tape drive, the vendor said.

Drives are available from 12.5 in./sec to 75 in./sec on 7-in. to 10-1/2-in. reels, Mini-Computer Systems said.

Controllers are expandable to four drives each. Dual density, phase encoding and NRZI are optionally available.

System prices start at $6,550 from the firm at 525 Executive Blvd., 10523.

Scope Data Signs Pact

KING OF PRUSSIA, Pa. – Scope Data, Inc., Florida-based manufacturer of a series of non-impact printers, has signed a nationwide maintenance agreement with Sorbus, Inc.

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The BTI 4000 series.

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BTI's 4000 system grows as you do—so you're never paying for more system than you want, or trying to get along with less system than you need.

Storage – lots of it.

Disk storage comes in 2.4 megabyte increments for smaller systems, and in 36 or 73 megabyte increments for the bigger applications. And if your needs are bigger yet, you can have almost 5 billion bytes of on-line storage on your 4000 system.

No hibernation.

You don't have to put a 4000 system to sleep to load or dump data, or to back-up your software. Selected portions or the complete contents of disk packs can be "mounted" or "dismounted" on-line. Files can be loaded from or dumped to magnetic tape—on-line. And a SNAP back-up allows you to copy the entire contents of a disk pack for safekeeping, with individual user activity suspended for a few minutes.

BASIC-X.

The 4000's user language, a superset of BASIC, greatly extended for more user power in business and scientific applications. BASIC-X,

DEC Minis Get Fast Memory

BEDFORD, Mass. – The Fasbus 11 memory from Cambridge Memories, Inc. (CM1) is a plug-compatible, high-speed semiconductor memory for the Digital Equipment Corp. PDP-11/45 and 11/50 computers.

The system plugs directly into the DEC high-speed bus, allowing optimum utilization of system speed, approximately 20% faster than comparable DEC memory, CM1 said.

The memory is field expandable in 4K increments to 32K words within the space set aside for the DEC MS11 series high-speed memory in the 11/45.

The processor will access Fasbus 11 memory directly through the PDP-11's Fastbus. A peripheral such as a drum or disk can access this high-speed memory via the Unibus, allowing faster data transfer, the vendor claimed.

Fasbus 11 memory provides byte parity generation and check and is software-compatible with all DEC-supplied system software, CM1 said.

Price of 16K of memory with controller and power is $10,500. CM1 is at 12 Crosby Drive, 01730.

High School Students Find 'Math Is Fun' With On-Line Floppies

OXNARD, Calif. – A high school here is using on-line floppy disks to store programs for its minicomputer-based time-sharing system.

The Channel Island High School uses a 12K, fixed-core Data General Corp. Nova to drive a floppy disk subsystem from Advanced Electronics Design (AED) using software from Educational Data Systems (EDS).

Richard Brunner, chairman of the school's math department, said students have used the system's four teletypewriters to work math problems in computer-aided instruction programs and to do simple programming.

The system's library also contains games for the students to play.

The system is intended "to motivate the kids [to see] math is fun," Brunner said.

The high school had a problem, though, because paper tapes had to be loaded for student use. This took five to 10 minutes, and, "if the reader was not reading right, we'd have to diagnose it.

"That might take a few more minutes," Brunner recalled.

"Then the period might end, and we would have to change programs again," he continued. "We could waste 10 to 15 minutes per class period getting these programs set up."

Solving the Bottleneck Problem

The school went looking for a floppy disk system that could end the program-loading bottleneck.

One possible vendor, Moxon, Inc. of Irvine, Calif. "had an excellent time-shared system for four teletypewriters," Brunner said, but the package did not include software to drive the disk system.

The school then considered Standard Logic Systems, but found that vendor's system could only support one user teletypewriter instead of the four the school already had.

Finally, the school chose the AED floppy disk system, using EDS' custom software.

The floppy system means "we can load programs within seconds, we don't have to worry about tapes breaking up . . . [or] readers getting dirty and not reading correctly," Brunner said.

It used to take 45 minutes to recompile the Nova's Basic, and now it takes less than five, Brunner added.

Brunner said the floppy disk addition to the mini system cost about $6,700.

LGS 37 Plots To 22 In./Sec

SANTA CLARA, Calif. – Logic Systems has introduced the LGS37 high-speed plotter with up to 37-in. wide standard roll paper capability.

The LGS37 is accurate and repeatable to ±1 step over the full 140-ft length of paper, with speeds up to 22 in./sec, the company claimed.

Designed to utilize standard increment plot routines with an X-Y plotter interface, the plotter uses either ballpoint, fiber tip, liquid ink or blackball pens, the vendor said.

The plotter is priced at $12,500 from the firm at 3520 Victor Ave., 95050.

CT-10 Converts Data For IBM Tape Drives

BAY SHORE, N.Y. – The CT-10 Converter/Controller from VMF Industries will accept any Ansi/Ecma cassette and convert the serially recorded data into 9-track parallel format for use with IBM 8-in. or 10-1/2-in. tape drives, the vendor said.

The unit serves as the controller for both drives during the transfer process. Data is blocked and formatted to user specifications; parity characters are also checked.

Front panels and status indicators can be user-specified, the vendor added.

The CT-10 costs from $3,500 to $4,500 from the firm at 216 N. Fehr Way, 11706.

TIMESHARING SYSTEM 256 USERS.

developed for BTI's 3000 series, now augmented for the 4000. BASIC-X has string arithmetic, providing extended precision for the accountant; a flexible file-handling structure with powerful features like non-interfering shared read/write access, and many other niceties that make the programmer's job easier and faster.

Uptime.

Because central processor and disk storage facilities can be deployed dynamically, you can pull a CPU or disk drive out of service for any reason, while maintaining system availability to all your users. Something to think about if your application can't tolerate any interruptions.

Fast, all-hours service.

24 hours a day, seven days a week, BTI service engineers are ready to help. Just call and tell us you have a problem. In minutes, a time-share specialist can access and exercise your system over the telephone, just as if he were standing next to it. With the 4000's on-line diagnostic capability, all it takes is a phone call.

Available today.

Our new 4000 series multiprocessor systems aren't ideas waiting for an order to see if they'll work.

Systems are already being delivered. And they're available for a wide array of business, commercial and scientific applications. Like dealer inventory, entertainment ticketing, financial services, real estate transactions, word processing, engineering design, manufacturing control.

The 4000 system offers a high usership capacity for a low cost of ownership, and can be a big money-maker for commercial timesharing firms, a big money-saver for in-house systems.

Representative Prices

Ports	Mass Storage (Megabytes)	Price
16	5	$ 55,500
32	72	89,000
64	219	171,276
128	365	305,686
256	657	561,702

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See a 4000 at the Computer Caravan

Systems Integration — Part 2

Careful Planning, A Little Know-How Smooth Process

By Randy L. Allen
Special to Computerworld

Computer systems incorporating mini-computer-based satellites are built of hardware and software pieces coming from a variety of vendors.

This means DP departments must be skilled at integrating these elements into the kind of system they want.

While it is hard enough to control in-house tasks, it is even more difficult to control tasks vendors must perform, tasks vital to the success of a project.

A user and his vendors should of course define reasonable schedules during the planning stage, but how can a user exercise control once the schedules have been set and approved?

One way is to hold periodic meetings with the vendors to discuss schedule progress. This provides visibility of possible slides.

Sufficient time should be allowed for components to be shipped in time to meet the delivery date. Because the hardware and software must be installed and checked out and the installation tested, you must keep your vendors prepared to meet their commitments. Following delivery, a daily progress report on the installation is advisable.

Regular progress reports on the systems integration task are of utmost importance. Only through regular reporting can a user remain aware of current project status and what corrective actions, if any, are required.

Reporting techniques should be realistic, at intermediate points in a project. In addition, the reporting method must reflect the relationship the various tasks have to one another.

Reporting problems can be broken down into two areas: how to subdivide the project for reporting purposes and how to report progress. Each subtask should be a measurable unit so it can be measured against the total project schedule.

The size of the subtask and the reporting frequency should depend on the length of the total project; that is, the larger the project, the larger the subtask and the lower the reporting frequency.

As an example, we did the written reporting on one of our data network system projects, by updating the milestone charts published in the project document. Oral reporting was done with teleconferences in the early stages of the project, then quickened to daily calls during the last, critical stages.

The teleconferences allowed each member to report on the progress, problems, new requirements and solutions in his area. Since everyone participated, any problem that impacted another area was quickly recognized and a plan developed to solve it.

Even the most carefully planned and controlled projects will encounter problems, but there are techniques to aid in their solution. Perhaps the most important and most generally available technique is to have management support at all levels and to have access to critical resources when needed. Typical problems include:

- Schedule slides.
- Missed or additional requirements.
- Hardware unavailability or failure.
- Software errors.
- Interface failure.

To forestall schedule difficulties, plan to allow sufficient time to accomplish the project, plus a little extra for problems. If a schedule problem is with hardware delivery, there are several options available.

First, if timing is critical, bring pressure to bear on the vendor at all levels to meet the original schedule. Second, consider alternative sources for the same or compatible hardware.

Most major equipment manufacturers make test time available when you have equipment on order. This time can help you with your schedules. However, if that time is insufficient, you can try to obtain more from the hardware vendor or you can purchase time from an installation in your area that has similar equipment.

Missed and additional requirements should be screened to determine how critical they are and what alternatives exist. If possible, additional requirements should be scheduled to follow the systems integration task.

Only those changes that are necessary for later accommodation of the missed requirement should be made, to avoid impacting the schedule adversely. As the system increases in complexity, the greater the likelihood is of a major impact when a change is made.

A change board, composed of key project members and system users or user representatives, is a useful technique for handling missed or additional requirements. The board's function is to review change requests and determine the action to be taken. The board is also capable of assessing the total project impact of a change.

You may also experience problems with either your own software or with a vendor's. In either case, it is important to document the problem in detail. Information that is helpful in resolving software problems includes:

- Program name.
- Date and time.
- Equipment used.
- Sample of input and output data.
- Core dump, if obtained.
- Console listing.
- Description of problem from operator, analyst and/or programmer.

This information should be gathered immediately, as it is difficult to predict what will be needed and easy to forget details if you delay.

Problems that arise at hardware interfaces or at interfaces between hardware or software are the most difficult to solve. This type of problem typically causes much finger pointing between vendors. In addition to the hours spent in trying to pinpoint the problem area, it can also result in maintenance fees, because many vendors will bill you for checking out a problem you assume to be theirs but later proves to be another's.

Then you and your technical people can determine a reasonable approach for the vendor to follow. There is no doubt that technical expertise and experience with interface problems are your most valuable assets.

Randy L. Allen is retail industry marketing manager for Boeing Computer Services, Inc.

Why pay good money for an 80-column printer if all it can print is 80 columns?

Our new 80-column Model 306C prints 80...96...and 132 columns per line —by simply flicking a switch or by software command.

Our 80-column Model 306C is unique. It's a 100 char/sec. 80-column printer. A 120 char/sec. 96-column printer. And a 165 char/sec. 132-column printer. You can have any two in the same machine —with column width controlled by software command or the flick of a switch. Ideal for hard-copy output. *And especially in receive-only communications to 1200 baud.*

New condensed type is what makes the 306C so versatile. Printing is very sharp and legible, but more compact. With multicopy printing and bold face characters on command. You just can't find better performance—for a variety of applications.

A wide selection of optional communications interfaces is also available. Pollable multidrop interfaces or communications adapters with buffer, ACK/NAK and auto answer. Computer interfaces, too. Other options include two-channel vertical format control. Automatic on-off motor control. And foreign and expanded character sets for multilingual printing.

Our Model 306C features reliability-proven large-scale integrated circuitry (LSI) on just one printed circuit card to minimize parts inventory and provide easy maintainability—another example of how Centronics' experience with printer technology can benefit you. For more information, write or call our nearest office.

About Centronics: Centronics offers you the broadest line of medium-speed printers anywhere. And provides you with optimum price/performance ratios. High-volume production assures prompt delivery. Service and parts are readily available through a network of field service offices. Look to Centronics for printers—and for reliability proven in tens of thousands of installations.

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The Prime Computer User Plan Fights Inflation:

One Prime 300 system gives each of 15 users a completely independent virtual computer. Each with a 128k byte virtual memory and disk operating system. Each for less than $7,400!

A Complete Virtual Computer for Every User.

Think about it. For less than $7,400, each user has access to a complete system that if purchased separately would cost over $60,000. The Prime 300's virtual memory disk operating system automatically and transparently allocates all real system resources among the users of the virtual machines. By applying virtual machine techniques to the handling of I/O operations, each user terminal has direct on-line communication with any peripheral device in the system. Disk back-up can be handled on-line, data can be read directly from cards, tape or disk, and output can be transferred directly from a terminal to cards, tape, disk or printer.

A File Management System supervises the Prime 300's memory hierarchy and provides each user with a variety of direct and sequential file access methods.

A Multilingual System.

Each user is free to write programs in FORTRAN, BASIC, Macro Assembler and Micro Assembler languages. So they can fit the language to the problem instead of the other way around. In fact, problems can be divided into subtasks and each written in the language best suited to the task. For added convenience, programs written in one language can call subroutines written in other languages. And to wrap everything up, all Prime programming languages used the same file system so that any program, written in any language can access any data base without any modification or reprogramming.

A Multifunction System.

A virtual memory Prime 300 is like having up to 15 separate computers in one box. So there's a lot of computing muscle available to tackle just about any mix of applications. Users can develop real-time application software, execute batch command files, use the system as a sophisticated calculator via immediate-mode BASIC, handle data base management, even develop microprograms for the Prime 300's writeable control store or other microprogrammable devices.

Three Systems to Get You Started.

Prime has put together three starter systems, each with a different price/performance balance. If you buy them as packaged, you get a system complete with all necessary system software, one-year maintenance policy and an attractive packaged system discount.

You can select a small system for up to four users built around a 300 with 64K byte main memory and 6M byte moving head disk for $44,000. Or a system for up to eight users we call "The Personal Archive System," that features four diskette units for loading and unloading individual user files, a 12M byte work disk and 300 processor with 128K byte memory, for only $68,000. For 15 users you can get a system with 256K byte main memory, 60M byte moving head disk, and 16-line asynchronous multiline controller for $110,000.

Virtually Unlimited Expansion.

Any of these starter systems can be easily and economically expanded. You can add main memory up to 512K bytes. Attach a total of eight 60 million byte disks, four 12 million byte disks and eight diskettes. Add multiple printers and tape drives. Mix terminal types and speeds. And support it all with exactly the same operating systems and language processors you started with.

Try it Before You Buy It.

Find out how a Prime 300 virtual memory system can help you fight inflation. Attend a Try It Before You Buy It seminar at the Computer Caravan. In every caravan city, Prime will conduct seminars to help you test and evaluate the Prime 300. Complete details are available from any Prime sales office or by writing to Prime Computer, Inc., 145 Pennsylvania Avenue, Framingham, MA 01701.

PRIME

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DPMA Plans Seminars Aiding Management

PARK RIDGE, Ill. – The Data Processing Management Association (DPMA) will sponsor a series of six three-day seminars on professional DP management beginning March 19.

The seminars, which will be offered in conjunction with Louis A. Allen Associates, Inc., will emphasize the application of the principles and techniques of professional management to the work of the DP manager, according to Martin H. Bowerman, DPMA's director of programs and services.

Louis J. Rieger and Robert C. Denman, senior associates at Allen, will present the seminars.

The schedule is March 19-21, Chicago; April 9-11, San Francisco; April 16-18, Atlanta; April 23-25, Toronto; May 14-16, Houston; and May 14-16, New York.

For further information, contact DPMA International, Programs & Services Department, 505 Busse Highway, 60068.

Calendar

March 17-19, Chicago – 21st Annual Management Systems Conference. Contact: American Management Association, The American Management Associations Building, 135 W. 50th St., New York, N.Y. 10020.

April 1-4, Osage Beach, Mo. – 1975 Spring Government Management Information Sciences Conference. Contact: Stan Heckman, Conference Chairman, 1510 East Elm St., Jefferson City, 65101.

April 8-11, Anaheim, Calif. – National Microfilm Association's (NMA) 24th Annual Conference and Exposition. Contact: NMA, 8728 Colesville Road, Silver Spring, Md. 20910.

April 14-16, New York – Fifth Conference on Computer Audit, Control and Security, sponsored by the Institute of Internal Auditors. Contact: Harold Weiss, Program Chairman, Automation Training Center, Newton Building, Reston, Va. 22090.

April 14-18, Mexico City – 42nd Management Conference, sponsored by the Association of Data Processing Service Organizations (Adapso). Contact: Adapso, Inc., Management Conference, 210 Summit Ave., Montvale, N.J. 07645.

April 21-23, New Orleans – Interfaee '75, the third annual Data Communications Conference and Exposition. Contact: Kenneth A. Puleo, Conference Publicity Manager, 160 Speen St., Framingham, Mass. 01701.

Societies/ User Groups

April 3-6, Los Angeles – Second International Conference on Computers and the Humanities (ICCH/2). Contact: Prof. Robert Dilligan, ICCH/2, Founders Hall 407, University of Southern California, 90007.

Info/Expo Publishes Exhibitor Prospectus

PARK RIDGE, Ill. – The exhibitor's prospectus for Info/Expo '75 is now available from the Data Processing Management Association (DPMA), the conference's sponsor.

The prospectus includes general information for exhibitors, preliminary program schedule, exhibition floor plan, exhibitor's activities program, a list of previous exhibitors and space reservation forms.

Martin H. Bowerman, DPMA director of programs and services, said DPMA is "planning for an exposition of 150 booths" and demand for space is considerably ahead of last year. Booth space sells for $700/100 sq-ft.

The conference is scheduled for June 29-July 2 in Atlanta. A free copy of the prospectus can be obtained from Programs and Services Department, DPMA International, 505 Busse Highway, 60068.

High School DP Fair Set as NCC Feature

ANAHEIM, Calif. – One of the special events at the 1975 National Computer Conference (NCC), May 19-22, will be a High School Computer Science Fair.

"The rapidly increasing availability of computing resources to the nation's high schools and the accompanying development of computer-related courses have produced significant computing capabilities in growing numbers of secondary school students," according to the sponsors.

"This year's High School Computer Science Fair promises to reflect this new awareness and should prove to be an exciting and relevant exhibition," they added.

The fair will be open to all West Coast high school students, and projects may be submitted by individuals or small groups. The grand prize, a Hewlett-Packard Model 65 calculator, will be awarded May 20 for the most significant project displayed.

Prizes will also be awarded in four specific areas – new applications of computers, systems programming, design and construction of computers and components and applications programming.

All entries must be submitted by March 15. For further information, contact George Vassilakis, Computer Science Department, University of Southern California, Los Angeles, 90007.

Call for Papers

INTERNATIONAL COMPUTER SYMPOSIUM (ICS) 1975, Aug. 20-22, Taipei, Republic of China.

The objective of this conference is the development of native language information processing and new applications of computer systems.

Papers are invited, in English, presenting new ideas, applications and experimental systems in native language OP, pattern recognition, signal processing, data communication systems and terminal-oriented systems, computer architecture, computer applications, computer education and government OP policy.

Two copies of an abstract no longer than 600 words must be sent by April 15 to Dr. Nanhung Kuo, chairman, Technical Committee, ICS '75, P.O. Box 186, Hsinchu, Taiwan 300, Republic of China.

FIRST NATIONAL CONFERENCE ON SOFTWARE ENGINEERING, Sept. 11-12, Washington, D.C.

IEEE Computer Society's Technical Committee on Software Engineering and the National Bureau of Standards will cosponsor the conference, which immediately follows Compcon Fall '75.

The conference will outline the scope of software engineering and, based on actual large-scale software project experience, will examine the practical tools and techniques that can be applied in the development process to promote reliability and quality in software systems.

Authors are invited to submit five copies of their papers by April 15 to Thomas Steel, program chairman, Equitable Life Assurance Society, 1285 Avenue of the Americas, New York, N.Y. 10019.

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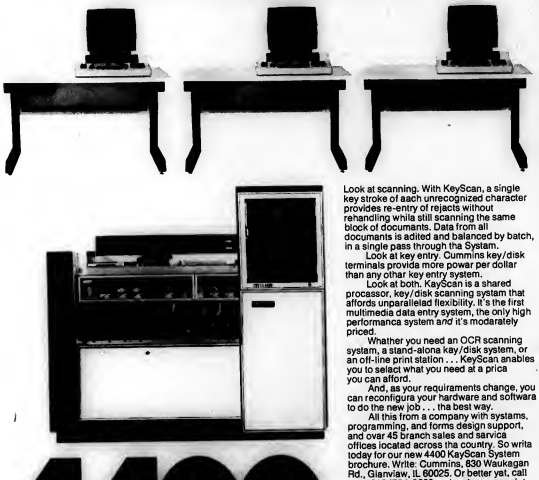

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CI Notes

Tymshare Suit Dismissed

CUPERTINO, Calif. – The U.S. District Court, Central District of California, dismissed the case against Tymshare filed by Allen Babcock Computing, Inc. and other plaintiffs.

The court ruled no violation of federal securities laws by Tymshare or its directors had been established and federal jurisdiction of the remaining claims was not appropriate.

Allen Babcock, which filed the complaint in conjunction with Tymshare's decision not to proceed with its acquisition of that company, may pursue its claims in state court.

The suit sought nearly $3.2 million in compensatory damages and $9.5 million in punitive damages.

HIS Markets Nippon System

Special to Computerworld

SYDNEY, Aust. – In a move to extend its customer base with a small office computer, Honeywell Information Systems is marketing Nippon Electric Co.'s NEAC 100 in Australia.

Called the System 6, the system has from 8K to 32K of main memory.

This marks the first marketing of Nippon systems abroad. HIS performed the translation on System 6 software, which is said to be compatible with its 60/61 systems.

Western Digital to Supply DEC

NEWPORT BEACH, Calif. – Western Digital Corp. will supply Digital Equipment Corp. with the four-chip microprocessor set used in DEC's LSI-11.

Manufactured under a $6.3 million contract, the N-channel units consist of a data chip, a control chip and two versions of the Microm chip which contain the micro instructions.

Supershorts

Computer Automation, Inc. (CA) said the Securities and Exchange Commission is investigating a possible violation of federal securities laws believed to involve trading in CA stock by officials of the firm.

– – –

R.H. Macy & Co., Inc. has ordered 425 NCR 280 electronic terminals, two NCR 725 processors and 11 NCR 751 data concentrators for its New York Herald Square store.

– – –

Computer Resources, Inc. of Cleveland, has formed a subsidiary, CRU, to manufacture and sell the Capacity Meter, a computer performance measurement system.

Many Installations Replacing 370s

Lessors Say 360 Demand Much Improved

By Molly Upton
Of the CW Staff

Citing a direct correlation between tightened purse strings and the renewed popularity of IBM 360s, lessors of those machines have reported business is well ahead of last year.

Demand for 360s has increased quite a bit even in the last six months, said Michael Creedon, executive vice-president of DPF, Inc.

In general, 360/65s seem to be the most in demand – and also the most difficult to supply – followed by 50s and 40s respectively.

But even the 30s are firming up very well, noted Jim Benton, executive director of the Computer Lessors Association.

William C. Landis, vice-president of Randolph Computer Co., attributed the 360's popularity to both the economy and disillusionment with 370s.

In addition, people are sticking with 360s while waiting for IBM's Future System (FS) to be announced, he said.

Many 370 installations are reconverting to 360/65s, 50s and 40s, and the trend is starting to reach the 30s now, Creedon said, adding some DP managers lost their jobs when management learned there were more cost-effective alternatives to a 370 rented from IBM.

Although opinions differ somewhat on how long the heavy demand for 360s will last, the current popularity is expected to be more stable than an evanescent phenomenon.

The 360s should have a good life in leasing firms for the next five or more years, said Landis.

Demand will continue to increase until FS is announced or a "drastic upturn in the economy," when people won't examine profit and loss statements so closely, is experienced, Landis said.

Creedon predicted demand will probably continue to hold up through the next three years because the industry is paying more attention to dollar performance.

Benton also sees business continuing to be healthy for the next few years. "You can almost say that, as soon as the economy stsrts chugging around again, people will start going to more expensive DP gear. But I certainly don't see that happening next year or maybe even the year after."

'Ludicrous Rates'

Although Landis noted prices are higher for many 360s than they were six months ago, Creedon said the rates are still very low.

"Demand alone does not offset our problems," he added.

Benton remarked that "relative to their processing power, the 360s are at ludicrous rates."

Rates are generally showing a slight improvement in reaction to stronger demand, Creedon conceded.

Landis noted fewer 360s are coming off lease, and users are taking them on longer, two- and three-year, leases, whereas a year ago a one-year lease was common.

Itel, which is phasing out of the 360 leasing business by selling its portfolio primarily to customers, is "significantly ahead of target," said Dick Lussier, president of Itel's Data Processing Division.

At the most it has one-third of its portfolio remaining and he sees "no problem" placing it. He noted the 65s and 50s have done extremely well.

Telex Verdict Cited

Transamerica Devalues Portfolio

By Nancy French
Of the CW Staff

SAN FRANCISCO – Transamerica Computer Corp. has reduced by half the book value of its IBM 360s and peripheral equipment as a result of the 10th Circuit Court of Appeals' reversal of the IBM-Telex decision.

Transamerica President James Rush said the court decision will seriously affect its business, as it raises questions in the minds of end users regarding the viability of Telex.

Regardless of whether the case is reversed in the Supreme Court, "any effect on our leasing business is going to be permanent," Rush said.

Transamerica owns a considerable volume of 360 plug-compatible Telex equipment that is serviced by agreement with Telex.

"The market for this equipment, as you know, is a finite market, so every decision a user makes to release a piece of equipment means that equipment will probably go into a warehouse and not out on lease," he explained.

The reserve action, according to Rush, will "drop the book value of the equipment from about $62 million to about $37 million.

"We now go into a cost-recovery method of accounting," Rush explained, "leaving us in a zero profit-and-loss position until such time as our book values have been reduced to zero."

It is estimated the reserve will cause previously reported net earnings of $54 million to drop to $40 million.

The company reduced the carrying value of its computer peripheral equipment by setting a $13 million after-tax reserve.

CRTs Seen Starting to Challenge Cost Edge of Printer Terminals

By a CW Staff Writer

DELRAN, N.J. – How much longer can the teleprinter manufacturer maintain his cost edge over the CRT display terminal vendor?

It may not be much longer at all, according to a recent study by Datapro Research Corp. here.

"Alresdy some CRT terminal vendors are leasing their products at market-shattering prices made possible by the svailability of large-scale integration (LSI) technology at ever-decreasing costs," the report said.

"Yet it is clear typewriter-style terminals will continue to be delivered in large numbers for many years to come," the study added, "because of the requirements for hard-copy output imposed by many applications."

Datapro went on to characterize the terminal market as "one of the fastest growing segments of the overall computer industry.

"The total number of terminals in use has skyrocketed from a mere 50,000 in 1965 to an estimated 1.5 million valued at $1.3 billion by the end of 1974 – a 30-fold growth factor in one decade," the report noted.

"Projections for 1978 forecast 2.5 million terminals in use with an estimated value of $2.2 billion," Datapro said in its study.

Currently installed teleprinters are valued at an estimated $325 million and account for about 26% of the total value of the terminal market, the market research firm remarked.

The firm expects this volume will grow to $360 million in 1975 and $441 million in 1978, "representing a relatively modest 35% increase in dollar value over the four-year period."

The leader in the teleprinter market "by an overwhelming margin" is Teletype Corp., an AT&T subsidiary with more than 700,000 units installed to date, the report said.

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Services Unite

CONCORD, Mass. – Forty independent service companies have incorporated under the name Indeserv, Inc. as a means of obtaining a piece of large contracts that would not normally be available to them as small local operations.

Indeserv specializes in providing national as well as regional field contracts to manufacturers and users of distributive processing equipment and terminals.

Unlike some large third-party service companies that sell a standard nationwide maintenance package to manufacturers whether they need it or not in every location, Indeserv offers maintenance help only where it's needed.

Member service companies, most of whom were formerly customer engineers with companies such as IBM, Honeywell and Digital Equipment Corp., now in business for themselves, receive a discounted fee for their services to cover association overhead.

Uses Mail, Phone Strategy

Recession Not Hurting This Disk Maker at All

By Marvin Smalheiser
CW West Coast Bureau

SCOTTSDALE, Ariz. – Born in a recession four years ago, International Memory Systems (IMS) is weathering the current slump with marketing and maintenance strategy dependent almost entirely on phone and priority mail service.

The results appear to be gratifying to Prentiss L. Smith, IMS president, who was also a founder of Vermont Research before he set up his own company to make disk memory systems for end users.

Sales last year were $1 million, three times the total for the previous year, Smith said.

"The recession is not hurting us at all. Our basic deliveries are up and continuing to go up," he said.

IMS makes the Data Miser series of moving-head disk memory systems, which have been aimed primarily at Digital Equipment Corp. PDP-11 installations in the U.S. and abroad.

The Data Miser consists of one to eight disk drives, a controller, disk operating system and full diagnostics. Maximum storage is 10M words in increments of 1.25M words.

There are now about 300 IMS installations and Smith plans to expand into the IBM System/3 market and to get into the systems business.

Selling by Engineers

The IMS marketing staff takes calls that come in on the company's 800 telephone number.

"The basic selling is done by applications engineers in Phoenix," Smith said.

The units are shipped by priority mail and 90% of installations are done by customers themselves.

"We discuss potential problems with the customer before the systems are sent and guarantee they will work," Smith said. "If one doesn't work, we will send our personnel here free of charge to make it work."

The user can pay a monthly service charge for maintenance or go on an exchange plan.

"If there is a problem with a controller, the user runs a diagnostic program and then calls us on our Wats line. He gives a readout on the diagnostic and we mail him a replacement card for one that may have gone bad.

"Or, if he diagnosed the problem as a disk problem, then we send him a new disk and he sends his back to the factory."

Smith feels the strongest market for his minicomputer peripheral is in small business systems.

"The minicomputer is going to be the only answer for dedicated, small business activity," he explained. "There is still only 10% to 15% penetration because the price is too high," he said, adding he feels the new low-cost minis with his disk system can lower the cost to increase that penetration.

IMS has already set up its own small business system for in-house use and put together a system for another compeny in northern Californie which will handle eight input lines – telephone or direct connection – simultaneously.

No Outside Financing

Smith said he feels his prime accomplishment with IMS is getting into the end-user environment without any outside financing.

He used $100,000 of his own money plus $50,000 from the engineering team from Vermont Research that joined him when he started.

But financing is still a problem because of the company's increasing growth rate. "If we had all the money we needed, we could quadruple our business next year," Smith said.

Smith is optimistic IMS will be eble to accelerate its business growth. It has set up distributors in Canada and Europe and will probably open an East Coast office soon.

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Airline Division Offers Spare Parts Delivery

MEMPHIS, Tenn. – Federal Express Corp., a small package airline headquartered here, has launched a new division providing a spare parts delivery service for the DP industry.

Critical Parts Supply (CPS) delivers parts from its warehouse in Memphis and is designed to enable customer firms to reduce inventory.

A consulting service dealing with spare parts logistics is also available. According to Wylie Tate, CPS vice-president, one company using this service found it could save 7% of its customer service budget by using CPS solely for spare parts distribution.

L.A. Tower's System Turns Music to Light

LOS ANGELES – The Los Angeles Mall's new Triforium theme tower will bring a touch of psychedelia to that city with a computerized audiovisual display combining lights, music and electronics.

The six-story structure will contain three banks of colored glass prisms – 498 in each set – hooked into a system programmed to flash various colored lights synchronized with music.

The system, designed by Joseph Young, converts musical tones into light and color values according to a preconceived pattern; for example, a blue note produces a blue light.

Conrac Corp. will supply the electronic innards for the display.

Startup of Stock-Trading Reporting System Delayed

By Nancy French
Of the CW Staff

NEW YORK – A stock-trading reporting system, designed to produce a consolidated stock-trading tape for six major stock exchanges, has been delayed once again with startup now targeted for June 16.

Once up and running, the system will produce two tapes – an "A" tape to carry transactions of all stocks listed on the New York Stock Exchange (NYSE) regardless of where they are traded and a "B" tape, listing all transactions of American Stock Exchange securities plus uniquely traded securities from the regional exchanges.

The delay has been attributed to the need for more testing than was originally anticipated, according to a spokesman from Securities Industry Automation Corp. (Siac), which will continue to serve the NYSE as processor in the system.

Bringing in data from the regional stock exchanges has vastly complicated the processing system Siac now operates. Since the regionals' tallying and reporting systems are all different, both manual and computerized data entry must be accommodated.

A Computer Communications, Inc. CC-70 communications controller will collect data fed from CRT terminals via low speed lines as well as information fed from regional computers via high-speed bisynchronous protocol, a Siac spokesman explained.

A duplex IBM 360/50 system will then merge the input into a single data stream for output to the low-speed ticker tape display as well as a high-speed transmission for distribution by three quote vendors – Bunker Ramo, Ultronics and Quotron, the spokesman said.

The system is undergoing "exhaustive" testing to assure the additional processing required by the exchange market data system will not jeopardize its operation.

The Siac spokesman said the exchange market data system has sufficient capacity to support the new reporting system for the next two years with no additional gear.

In addition to the NYSE and the American Stock Exchanges, participating exchanges include the Midwest, Pacific and PBW (formerly known as Philadelphia, Baltimore and Washington) and the National Association of Securities Dealers, which oversees over-the-counter trading.

NYSE Brought to Halt

NEW YORK – Trading ground to a halt on the New York Stock Exchange (NYSE) for 36 minutes one Friday earlier this month "due to computer failure."

The NYSE has been plagued with DP-related problems three times since the beginning of the year, although one trading halt was caused by telephone cable misfunction.

Over the years, the system has had a better record, with five trading halts since the beginning of 1974 and one in 1972, a spokeswoman said.

Offshore Multichip Packages No Longer Bargains, Study Says

LOS ANGELES – Multichip integrated circuit packages manufactured offshore are nearly as expensive now as those manufactured domestically, according to a recent Darling & Alsobrook report.

The report urged manufacturers wishing to reduce production cost and system size to consider multichip packages manufactured domestically using automation, instead of single-chip packages.

The analysis revealed the assembly cost of single-chip packages is much higher overall than any of the multichip assemblies, with the cost of domestic manufacture of monolithic chips decreasing.

At $17.74 per device, manual, offshore single-chip wire bonding is presently the most costly approach, the report said. In contrast, manual offshore production of a typical 16-chip device results in an $11.96 price tag, while automatic on-shore wire bonding brings a $13.13 tab.

The report said systems support costs, too often glossed over in planning, have a "striking influence" on the overall cost.

For example, the single-chip offshore system cost was found to be $8, or 45% of the total $17.74 price, while for automatic on-shore multichip production, system support cost was found to be $2, or 15%, of the total.

The report is available from the company at 1801 Ave. of the Stars, 90067.

Orders & Installations

Kings Markets, Inc. has installed NCR 255 supermarket systems in two of its 26 stores and has ordered two more in its conversion to electronic checkout systems.

Springs Mills, Inc. and **Wamsutta Knitting Mills** have ordered yield control systems for their doubleknit finishing operations from Measurex Corp.

Eversman Manufacturing Co., a manufacturer of large farm equipment, has ordered a Univac 90/30 for its Denver headquarters.

University Computing Co. will install six of its proprietary banking software systems at Multibank Computer Corp., a subsidiary of Multibank Financial Corp.

Warner Hardware, a chain of 21 retail and three wholesale hardware stores, has ordered a Honeywell Series 60 Model 64/20 system.

Mainstream, Inc., a service bureau, has installed an NCR Century 251 to aid in monitoring the performance of truck fleets.

Burroughs has installed two B6700 large-scale computer systems at General Mills, Inc.

Pioneer State Mutual Insurance Co. has ordered a Univac 90/30 to be used in rating and writing policies, premium notices and changes, agent information, statistical reporting and general accounting.

Bildisco has ordered a DM 140 data management system from General Automation, Inc.

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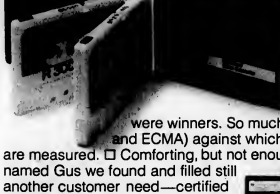

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CALCOMP

IBM '74 Report Shows Rising Capital, Declining Debt

By Molly Upton
Of the CW Staff

ARMONK, N.Y. – IBM's 1974 annual report showed the firm continued the sought-after combination of rising working capital and declining long-term debt, a feat it has managed since 1972.

Long-term debt declined at the end of fiscal 1974 to $335.8 million from $652.2 million in 1973, while working capital, which has been rising through the five years illustrated in the report's comparative summary, reached $3.8 billion from $3.275 billion last year.

IBM said it repaid about $300 million of debt previously incurred to comply with regulations of the Office of Foreign Direct Investments of the U.S. Department of Commerce. The regulations expired in early 1974.

In conjunction with the declining debt, IBM paid $69.1 million in interest on debt, a decrease of 28.8% from the $97.1 million paid a year ago.

Of its remaining consolidated long-term debt, $72.1 million is payable in 1976, more than twice as much as in any single year through at least 1980.

Putting its funds to work, IBM gained $340.8 million from "other income, principally interest," which was up 26.2% over $270.1 million received in 1973, when there was a 41.2% increase over the $191.3 million in 1972.

"The increases in both years resulted from higher interest rates and a larger average portfolio during each of these years," the firm said.

Cost of Sales Up

As did other firms, IBM found the cost of doing business increased. Cost of sales, rentals and services combined increased 11.6% in 1973 and 13.3% in 1974.

The cost of 1974 sales rose 14.9% to $1.242 billion in 1973, which was a 7.5% increase over the cost in 1972.

Rentals and services costs rose 12.7% in 1974 to $3.327 billion compared with $2.952 billion in 1973, a 13.4% increase over the 1972 cost.

"Each of these increases was lower than the comparable increase in gross income except for the increase in cost of rentals and services in 1974," the report explained.

"This increase was at a greater rate due to increased costs resulting from the pressures of inflation as well as changes in the mix of products and services which have different levels of cost."

Selling, development and engineering and general and administrative expenses increased 18.2% in 1974 to $4.759 billion compared with $4.025 billion in 1973, which was a 16.3% rise over the previous year's expenses.

"These increases exceeded those in total gross income mainly as a result of the effect of worldwide inflation," the firm said.

Research and development expenses amounted to $890 million in 1974 and $730 million in 1973.

Gross Rentals

During 1974, 78% of IBM's gross rentals came from sales, rentals and services of DP machines, while other regular products and services accounted for 19% and special products and services for U.S. space, defense and other agencies contributed 3%.

In the area of capital expenditures, IBM invested $2.913 billion in plant rental machines and other property in 1974, compared with $2.186 billion in 1973.

Retirements amounted to $1.16 billion, "covering obsolete and dismantled equipment, as well as rental machines sold previously were under lease to customers. These write-offs were charged against amounts provided out of prior and current years' earnings or to cost of sales," the report said.

In the text of the report, IBM Chairman Frank T. Cary indicated IBM will study the options available to IBM in entering the satellite business to determine "whether any of them offers a viable business opportunity for the company."

In January, the Federal Communications Commission denied a petition in which IBM sought to become a 55% partner along with Comsat General Corp. in CML Satellite Corp., but outlined alternative methods for IBM to enter the business [CW, Feb. 5].

In marketing and service, installations of the System/3 Model 15 have already exceeded original estimates, the firm said.

IBM World Trade Europe/Middle East/Africa, which obtains the largest share of gross income from business in western Europe, had a record year in installations, with "orders for large systems and for data base/data communications systems increasing significantly."

IBM employs about 131,000 persons outside the U.S. Its overseas operations have supported about one out of five of its U.S. manufacturing jobs, the report claimed.

Ink-Jet Printing

As indicated in the Telex documents, IBM scientists are working on ink-jet printing – "the process of literally squirting ink droplets through the air to form characters on paper."

Scientists have used semiconductor circuit-processing techniques to "drill" the nozzle holes and have developed a magnetic ink which can be deflected by a magnetic field to form the characters, according to the report.

Work on magnetic bubble memories with over 1 billion bit/sq-in. is progressing, the report said.

Minority employment, a subject of some stockholder interest, has increased from 9.7% to 10.6% of total employee population. The number of women employees rose from 15.3% to 16.7%.

There are 17.1% more minority managers and 19.3% more women managers than in 1973.

In hiring of new employees, minorities constituted 22.9% and women 38.7%, "with significant emphasis on the recruitment of sales and technical people," the report added.

Uniflo May Abandon PRT After Bid Failure

MINNEAPOLIS – Uniflo Systems Co. will probably abandon its personal rapid transit (PRT) system after a recent unsuccessful contract bid.

Vernon H. Heath, president of Rosemount, Inc., the parent firm, made the announcement after Uniflo was excluded from the awarding of three preliminary design contracts by the Department of Transportation to manufacture and test a PRT system in Colorado.

Heath said Rosemount "simply does not have the resources to continue supporting Uniflo without some tangible government encouragement."

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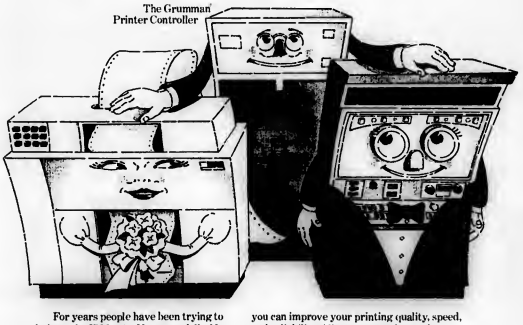

For years people have been trying to imitate the IBM 1403. Unsuccessfully. Now, with the Grumman Printer Controller you can connect your present computer to an IBM 1403 and give yourself the best printing in the business.

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With our printer controller you can connect the IBM 1403 to your present DEC, Xerox, GA, or CDC computer. We'd like to hear from Burroughs, Univac and the other computer users, too. For complete information please write or call Jon Ayers, Grumman Data Systems, Computer Products Division, 45 Crossways Park Drive, Woodbury, New York 11797. (516) 575-3034.

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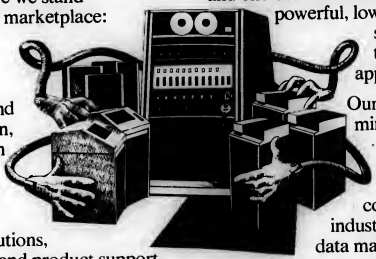

In these three areas, we offer a better package of total solutions, performance, price and product support than any computer company in the world.

No other computer company has worked so hard or dug so deep to understand the requirements of these three corners of the marketplace.

Involvement has always been our long suit.

We've never favored the sell 'em and leave 'em end of the business. Which is why we're *not* number one in volume hardware sales. We think it's better to be the best specialist than the biggest generalist.

The most mini for the money.
A good example is our family of SPC-16 computers. Quite simply, they are the world's most powerful minicomputers. They do more work in less time with less memory than any other mini you could buy. As a result, we offer the least expensive solutions instead of the least expensive minicomputers.

Our SPC-16 family has helped a lot of OEMs and end-users build a lot of powerful, low-cost systems for a lot of tough, tight-budget applications.

Our family of mighty minis is also one of the primary reasons we offer so much capability in communications, industrial automation and data management systems.

The best total communications systems.
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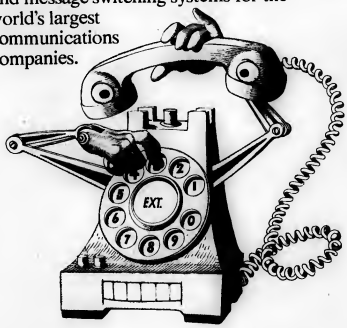

Our extensive experience has also made us the number one solver of tough problems for any company that needs a custom communications system.

If we can't solve your communications problem, nobody can.

The best total data management systems.
We can put you in better touch with your business by replacing a lot of time-consuming, non-productive status meetings, paperwork and guesswork with simple, automated systems that tell everyone who needs to know, everything they need to know, whenever they need to know it. No matter where they are or what they do or how they do it.

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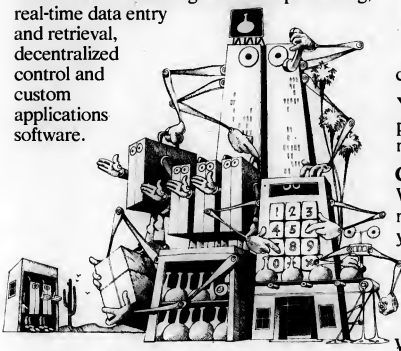

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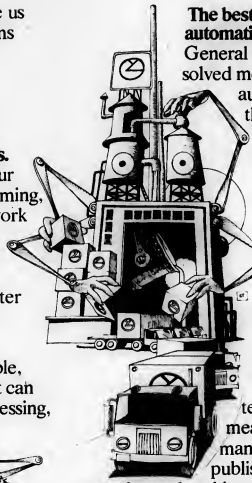

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Six-Month Earnings Down at Calcomp

ANAHEIM, Calif. — A faltering second quarter in which earnings dropped sharply below those of the year-ago period helped pull California Computer Products, Inc.'s (Calcomp) six-month earnings below those of last year.

Revenues during both the quarter and six months rose, however.

Calcomp has begun to retrench to bring costs in line with revenues in order to ensure a profitable year, a spokesman said.

For the quarter, earnings totaled $270,00 or 9 cents a share compared with $2.4 million or 69 cents, including $1.1 million in tax credits, a year ago.

Revenues climbed slightly to $31.9 million from $31.4 million during the quarter.

In the six months, Calcomp earned $1.1 million or 33 cents a share compared with $3.6 million or $1.08 a share last year, which included a $1.6 million tax credit.

Revenues rose to $64.7 million from $57 million a year ago.

Calcomp's subsidiary, Airform, has been reduced to a manufacturing facility and Signal Galaxies has stopped manufacturing add-on memories for minicomputers. Calcomp will continue to service those in the field.

Calcomp has also laid off about 10% of its peak employment force, estimated around 4,200 worldwide, in the last five months.

Toward the Bottom Line

Wang Laboratories ended its salary cutbacks Feb. 15, two weeks ahead of schedule. The firm will pay a semiannual dividend of 4 cents a share payable March 10 to shareholders of record Feb. 21.

$$$

Add Time, Inc. to the list of investors in Telenet's recent financing [CW, Jan. 29], which now totals $2.1 million.

$$$

Datum has been accepted for listing on the Boston Stock Exchange under the symbol DATM or DTM.

$$$

Centronics is listed on the New York Stock Exchange under the symbol CEN.

IBM has announced a quarterly dividend of $1.50 a share payable March 10 to holders of record Feb. 13. The dividend will be the same as that paid in the last two quarters.

$$$

Burroughs' quarterly dividend will rise 20% to 15 cents a share from 12.5 cents a share. The new dividend is payable May 7 to shareholders of record April 9. This marks a change in payment date.

$$$

Hewlett-Packard declared a semiannual dividend of 10 cents a share payable April 15 to stockholders of record March 24.

$$$

MSI Data has obtained a standby credit agreement for $11 million with Union Bank of California and First National Bank of Chicago. The loan will be used to repay $8.8 million in short-term notes and to expand working capital.

$$$

Commerce Group's computer leasing has been profitable and is expected to benefit from recent signs that "users are not continuing to follow the long-ng-established trend of having to use the biggest and most expensive system available," Edward L. Machulak, president, said.

$$$

Quantor has completed financing totaling $6.9 million, consisting of the sale of convertible preferred stock to NCR for $1.2 million and an agreement for a $5.7 million bank line of credit. The agreement requires stockholder approval.

Acquisitions

Wallace Business Forms, Inc. has acquired Continental Carbon Manufacturing Co., which will operate as a Wallace subsidiary.

Tymshare, Inc. has completed the acquisition of United Data Centers, Inc. which becomes a subsidiary.

American Can Co. has acquired controlling interest in Aspen Systems Corp. by partial exercise of a five-year stock option.

California Computer Products, Inc. (Calcomp), has finalized the acquisition of Xytex Corp., now XTX Corp., for 149,600 shares of Calcomp stock.

Stretching your hardware dollar

A special report on hardware options that can save you money - in the March 26th issue of *Computerworld*.

In this special supplement to *Computerworld*, edited by Vic Farmer, we'll be taking a look at different ways users have maximized performance and saved money at their installations through hardware options - including used computers, multiple vendors, and various leasing arrangements, to name a few. The risks involved in these options are an important part of this special *Computerworld* report, and we'll analyze them in detail. You'll see articles like these:

- **Applications stories that profile users who have successfully saved money through various hardware options.**
- **The benefits and risks of long-term and third-party leases, and other leasing arrangements.**
- **Used computers - a bargain or a challange?**
- **360 enhancements - what the independents are doing to increase their data processing power.**
- **An analysis of the activity of Independent Peripheral Suppliers and their helpfulness to users over the past five years.**

If you're looking for ways to save hardware dollars at your installation, then you should be reading this special report in the March 26th issue of *Computerworld*. And if you're marketing peripheral equipment, used computers or leased computers to the EDP industry, don't miss our March 7th ad closing. Contact your *Computerworld* salesman for all the details. Or call Judy Milford at (617) 965-5800.

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Foreign Orders & Installations

Kelly Douglas Co. Ltd. has ordered three more computerized point-of-sale and store automation systems from MSI Data Corp. for its Super Valu supermarkets in western Canada.

Sara Assicurazioni, an Italian insurance firm, has ordered a Univac 90/60 valued at more than $1 million.

Lego A/S, a Danish toy manufacturer, has installed an NCR Century 251 to centralize administrative control.

The first installations of the NCR 255 electronic checkout system have begun in Europe and the Far East. The Jumbo hypermarket in Villars-sur Glane, Switz. has installed 25 terminals and an NCR 726; eight terminals and an NCR 726 have been ordered by United Supermarkets of Manila.

London On-Line Local Authorities, a group of local governments entities, has ordered 63 PTS-100 programmable terminals from Raytheon Cossor Data Systems.

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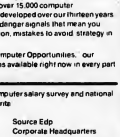

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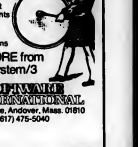

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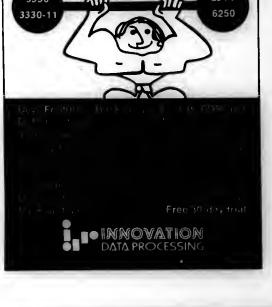

INNOVATION
DATA PROCESSING

CA Second-Quarter Earnings Dip 20%

IRVINE, Calif. – As predicted by the firm, Computer Automation, Inc.'s (CA) second-quarter and six-month earnings declined, although revenues rose.

President David H. Methvin attributed the second-quarter performance to continuing inflationary cost pressures, higher bank interest charges and a "general slackening" in order and shipping volumes from anticipated levels.

Second-quarter earnings dipped 20% to $320,613 or 19 cents a share compared with $401,632 or 24 cents a share in the year-ago period.

Revenues rose 20% to $5.1 million from $4.2 million in the same period last year.

Although cost of sales was down slightly, selling, development and administrative expenses rose to $2.5 million from $1.4 million last year.

During the six months, CA's earnings fell to $515,901 or 31 cents a share compared with $798,412 or 48 cents a share in the comparable year-ago period.

Revenues rose to $10.3 million from $8.2 million.

Selling, development and administrative expenses amounted to $4.7 million compared with $2.7 million last year.

Methvin noted CA's minicomputers are typically used in automation systems intended to reduce operating costs and increase productivity in industrial and commercial sectors.

CMC Gets Funds To Carry Leases

MARINA DEL RAY, Calif. – Computer Machinery Corp. (CMC) has completed refinancing agreements that will enable it to carry its own leases on equipment.

"Carrying our own equipment leases," rather than selling the lease interests to financial institutions, "will return significantly greater aggregate profits over the long term," Thomas L. Ringer, CMC president, said.

"To achieve that goal, we will have to accept losses in the short term while revenues from company-owned leases are building up."

'Diminishing Losses'

CMC posted a "substantial" loss last year, he said, but expects "diminishing losses" in 1975. Beginning in 1976, the firm expects "rapidly accelerating profitability" from the build-up of recurring lease revenues.

Financing came from Security Pacific Bank and First National City Bank, which agreed to extend CMC's domestic line of credit through 1976 to $25 million from $17 million.

European banks agreed to increase CMC's credit to $26 million from $21 million, contingent on completion by CMC of a $2-million sale of customer-leased equipment to a leasing company and a $2.5-million sale and leaseback of equipment. Both transactions were completed recently.

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Minimaker Microdata Reports Record Year

IRVINE, Calif. – Minimaker Microdata Corp. reported a record year ended Aug. 31.

Earnings rose to $641,466 or 41 cents a share, including a $265,000 tax credit, compared with $524,781 or 34 cents a share in 1973, when there was a $228,000 tax credit.

Earnings for 1973 have been restated to reflect expensing of R&D costs as incurred.

Revenues for the year rose to $13.8 million, compared with $8.7 million in 1973.

Microdata presently has more than 6,000 computers installed, the firm said.

Revenues Rise 54% In GCS Year Results

DALLAS – General Computer Systems, Inc.'s (GCS) books showed record earnings and revenues for 1974. Revenues rose 54% to $15.1 million compared with $9.8 million in 1973.

Earnings, including a hefty tax credit of $501,945, rose to nearly $1.1 million or 64 cents a share compared with $409,016 or 25 cents a share.

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Earnings Reports

VARIAN ASSOCIATES
Three Months Ended Dec. 27

	1974	1973
Shr Erng	$.21	$.21
Revenue	72,689,000	67,393,000
Earnings	1,462,000	1,385,000

a-Restated to reflect change to Lifo accounting method.

WANGCO
Three Months Ended Dec. 28

	1974	1973
Shr Erng	$.20	$.35
Revenue	4,810,153	3,506,118
Earnings	214,092	380,741

HONEYWELL
Year Ended Dec. 31

	1974	1973
	(000)	(000)
Shr Erng	$3.71	$4.68
Revenue	2,626,606	2,407,455
Tax Cred	3,598	3,305
Earnings	75,768	95,136
3 Mo Shr	1.43	2.08
Revenue	763,242	716,074
Tax Cred	3,503	3,069
Earnings	27,664	41,238

a-Restated to reflect an accounting change.

BARRY WRIGHT
Year Ended Dec. 31

	1974	1973
Shr Erng	$1.15	$1.90
Revenue	45,986,693	38,484,135
Spec Cred	.....	864,033
Earnings	1,272,675	1,645,365
3 Mo Shr	.39	.33
Revenue	12,300,506	10,357,197
Earnings	433,410	361,649

a-Reflects Lifo accounting method for half of total inventories. b-Gain on sale of land.

DECISION DATA
Year Ended Nov. 30

	1974	1973
Shr Erng	$.40	.....
Revenue	40,607,000	$18,461,000
Tax Cred	722,000	.....
Earnings	1,511,000	(666,000)
3 Mo Shr	.16	.01
Revenue	12,683,000	6,250,000
Tax Cred	332,000	.....
Earnings	687,000	41,000

NCR
Year Ended Dec. 31

	1974	1973
	(000)	(000)
Shr Erng	$3.53	$3.00
Revenue	1,979,003	1,816,281
Earnings	87,165	71,961
3 Mo Shr	1.40	1.40
Revenue	626,388	577,426
Earnings	35,340	34,675

CALIFORNIA COMPUTER PRODUCTS
Three Months Ended Dec. 29

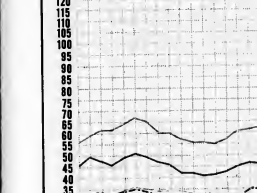
	1974	1973
Shr Erng	$.09	$.77
Revenue	31,873,000	31,356,000
Tax Cred	.....	1,063,000
Earnings	270,000	2,354,000
6 Mo Shr	.13	1.18
Revenue	64,746,000	57,041,000
Tax Cred	.....	1,620,000
Earnings	1,052,000	3,666,000

CENTRONICS DATA COMPUTER
Three Months Ended Dec. 31

	1974	1973
Shr Erng	$.38	$.36
Revenue	10,027,421	9,762,497
Earnings	1,815,542	1,839,066
6 Mo Shr	.76	.75
Revenue	20,265,528	18,269,764
Earnings	3,626,260	3,624,403

COMPUTERWORLD Computer Stocks Trading Indexes

Computer Systems — Software & EDP Services
Peripherals & Subsystems — Leasing Companies
Supplies & Accessories — CW Composite Index



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Computerworld Stock Trading Summary

CLOSING PRICES THURSDAY, FEBRUARY 20, 1975

All statistics compiled, computed and formatted by TRADE&QUOTES, INC. Cambridge, Mass. 02139

E		---PRICE---		WEEK	WEEK
X		1974	CLOSE	NET	PCT
H		(1)	1975	CHNGE	CHNGE
	COMPUTER SYSTEMS				
N	BURROUGHS CORP	82-109	87 3/4	+1 1/2	+1.7
O	COMPUTER AUTOMATION	2- 14	5	+ 3/4	+17.8
N	COMPUTER DATA CORP	10- 38	17 1/4	+ 3/4	+4.5
N	DATA GENERAL CORP	10- 38	18	-1	-5.3
O	DATAPOINT CORP	10- 15	3 1/2	+ 1/4	+7.7
O	DIGITAL COMP CONTROL	1- 5	3/4	0	0.0
N	DIGITAL EQUIPMENT	101-121	74 3/4	+ 1/4	+0.3
N	ELECTRONIC ASSOC.	1- 3	1 3/4	+1/8	+8.8
N	ELECTRONIC ENGINEER.	1- 11	1 7/8	0	0.0
N	FORSORO	18- 48	27 1/2	+ 1/4	+0.9
O	GENERAL AUTOMATION	10- 40	12	+ 7/8	+7.8
O	GRI COMPUTER CORP	1- 2	1/4	0	0.0
N	HEWLETT-PACKARD CO	50- 90	62 1/2	+2 5/8	+4.3
N	HONEYWELL INC	10- 88	53	+ 1/2	+1.9
N	IBM	152-251	217 3/4	+ 1/4	+0.1
O	INTEROATA INC	0- 22	18	+ 5/8	+3.4
O	MEMOREX	2- 7	3 1/8	0	0.0
O	MICRODATA COMP	1- 5	2 5/8	0	0.0
NO	NCR	71- 97	83	- 3/4	-0.8
N	RAYTHEON CO	21- 39	33 1/4	+ 1/8	+0.3
N	SPERRY RAND	24- 41	34 5/8	- 7/8	-2.5
O	SYSTEMS ENG. LABS	1- 3	1 1/4	0	0.0
O	ULTIMATE SYSTEMS INC	1- 3	1 1/4	0	0.0
N	VARIAN ASSOCIATES	9- 13	8 3/8	- 3/8	-4.2
N	WANG LABS.	7- 20	9	- 3/8	-4.0
N	XEROX CORP	58-127	78 1/2	+2	+2.9
	LEASING COMPANIES				
O	COMDISCO INC	1- 7	1 5/8	0	0.0
A	COMMERCE GROUP CORP	0- 4	1 1/4	+ 1/8	+10.0
A	COMPUTER INVSTRS GRP	0- 4	1 1/4	0	0.0
A	ELECTRONIC RENTAL	1- 3	1 1/4	0	0.0
A	GCI INC	0- 1	3/8	+ 1/8	+50.0
OC	DPC INC	0- 1	3/8	0	0.0
A	EDP RESOURCES	0- 3	1 3/4	- 1/4	-12.5
A	GRANITE MGT	0- 3	1 3/4	+ 1/4	+16.6
A	GREYHOUND COMPUTER	5- 8	5 1/4	+ 1/8	+2.3
A	ITEL	3- 12	5 1/2	- 1/8	-2.2
O	LEASCO CORP	3- 12	5 1/2	+ 1/4	+4.7
A	LOGARAC CORP	1- 2	3/4	+ 1/4	+50.0
O	LOCATEC MGT INC	0- 1	1/4	0	0.0
O	NRB INC	1- 5	2 1/8	- 1/4	-10.5
A	ALSHIRE TEC CORP	10- 16	9 3/4	+ 1/4	+2.6
A	ROCKWOOD COMPUTER	0- 1	1/2	- 1/8	-12.5
N	U.S. LEASING	8- 24	11	- 1/4	-1.1

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; NW=NORWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

E		---PRICE---		WEEK	WEEK
X		1974	CLOSE	NET	PCT
H		(1)	1975	CHNGE	CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 3	5/8	0	0.0
A	APPLIED D.A. RES.	1- 3	2	+ 1/4	+23.0
N	AUTOMATIC DATA PROC	21- 37	41 3/4	+1 1/4	+3.0
O	BRANDON APPLIED SYST	1- 3	1 1/2	0	0.0
O	COMPUTER DATA SYSTEMS	4- 8	3	0	0.0
O	COMPUTER DIMENSIONS	1- 3	1 5/8	0	0.0
O	COMP ELECTION SYSTMS	3- 3	3	0	0.0
O	COMPUTER HORIZONS	1- 2	1/2	- 1/8	+33.3
O	COMPUTER NETWORK	1- 2	1 1/4	- 1/8	-9.0
O	COMPUTER SCIENCES	1- 4	1 1/2	+ 1/8	+9.0
O	COMPUTER TASK GROUP	1- 1	1/2	0	0.0
O	COMPUTER USAGE	1- 4	2 1/2	- 3/8	+15.0
O	CONSHARE	2- 4	3 1/4	0	0.0
O	DATATAB	1- 3	1 1/4	0	0.0
A	ELECT COMP PROG	1- 2	1/4	0	0.0
O	ELECTRONIC DATA SYS.	15- 25	18	- 3/4	-4.0
O	INFORMATIONAL INC	1- 2	1/8	0	0.0
O	IPS COMPUTER MARKET.	1- 3	1 1/4	+ 1/8	+9.0
O	KEANE ASSOCIATES	2- 4	1 3/4	0	0.0
O	KEYING CORP	0- 1	1/4	0	0.0
O	LOGICON	2- 5	3 3/8	- 1/4	-6.8
A	MANAGEMENT DATA	2- 8	2	- 1/4	-11.1
N	NATIONAL CSS INC	0- 37	9 1/4	- 1/4	-3.0
O	NATIONAL COMPUTER CO	1- 1	1/2	0	0.0
N	ON LINE SYSTEMS INC	0- 30	11 6/8	0	0.0
N	PLANNING RESEARCH	1- 3	3 1/8	+3/8	+16.0
O	PURDUE COMPUTING & SYS	1- 1	5/8	0	0.0
O	RAPIDATA INC	1- 3	2 1/8	0	0.0
O	SCIENTIFIC COMPUTERS	1- 1	1	+ 1/8	+14.2
O	SECURITY COMPUTER	1- 1	1/4	0	0.0
O	TYMSHARE INC	0- 4	1 1/4	+ 1/8	+10.0
O	UNIVERSITY DATA CENTER	2- 3	2 1/2	0	0.0
A	URS SYSTEMS	2- 4	2 1/2	+ 1/4	+11.1
N	VYLY CORP	1- 6	2 5/8	+ 1/8	+5.0
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	3- 11	8 1/8	+5/8	+11.3
O	ADVANCED MEMORY SYS	1- 2	1 1/4	0	0.0
N	AMPEX CORP	3- 6	4 3/8	- 1/4	-5.4
O	ANDERSON JACOBSON	1- 7	2 1/8	- 1/8	-5.5
O	BEEHIVE MEDICAL ELEC	1- 7	2 1/8	+ 1/8	+6.2
A	BOLT,BERANEK & NEW	3- 7	5	0	0.0
N	BUNKER-RAMO	3- 8	5 3/4	+ 1/8	+2.2
O	CALCOMP	3- 11	6 3/4	+ 1/8	+1.8
O	CAMBRIDGE MEMORIES	3- 10	3 3/8	- 1/8	-3.6
N	CENTRONICS DATA COMP	1- 23	14 3/8	+2 3/8	+19.7
O	CODEX CORP	8- 19	10 1/2	- 3/4	-3.4
O	COMPUTRONICS	1- 2	3/8	0	0.0

E		---PRICE---		WEEK	WEEK
X		1974	CLOSE	NET	PCT
H		(1)	1975	CHNGE	CHNGE
O	COMPUTER COMMUN.	1- 2	1/2	0	0.0
O	COMPUTER CONSOLES	2- 5	3 1/4	0	0.0
O	COMPUTER EQUIPMENT	1- 2	1 1/2	+ 1/8	+8.0
O	COMPUTER MACHINERY	1- 2	1 1/2	+ 1/8	+10.0
O	COMPUTER TRANSCEIVER	1- 2	1 1/8	+ 1/4	+28.5
O	COMTEN	1- 4	2 3/8	+ 1/4	+5.5
N	COMBAC CORP	10- 22	18 7/8	+ 7/8	+5.0
O	DATA ACCESS SYSTEMS	2- 4	1 1/2	0	0.0
O	DATA 100	4- 13	7 7/8	+ 3/4	+10.5
O	DATA PRODUCTS CORP	2- 7	3 1/4	+ 1/4	+8.0
O	DATA TECHNOLOGY	1- 4	1 5/8	0	0.0
O	DELTA INC	0- 1	1/4	+ 1/4	+20.0
O	DECISION DATA COMPUT	1- 2	1/2	+ 1/8	+33.3
O	DIGI-DATA CORP	1- 2	1/2	+ 1/8	+33.3
O	ELECTRONIC CONTROLS	1- 3	1 1/2	0	0.0
O	ELECTRONIC SYS & EN	1- 4	1 7/8	0	0.0
O	FABRITEK INC	1- 4	1 1/8	+ 1/8	+12.5
O	GENERAL COMPUTER SYS	1- 4	1 1/4	- 1/2	-28.5
N	HAZELTINE CORP	3- 6	4 1/4	+ 1/8	+2.9
N	HARRIS CORP	13- 34	10 3/4	+1	+9.3
A	INCOTERM CORP	1- 3	3	0	0.0
O	INFOMEC INC	1- 3	1 1/8	- 3/8	-18.0
O	INFORMATION INTL INC	8- 14	10 7/8	+ 7/8	+8.7
A	LUNDY ELECTRONICS	1- 3	1 7/8	0	0.0
O	MANAGEMENT ASSIST	1- 1	1/4	0	0.0
O	MICRO ELECTRONICS	1- 2	1 1/4	- 1/8	-9.0
N	MOHAWK DATA SCI	1- 4	2	0	0.0
O	ODEC COMPUTER SYST.	1- 2	3/4	0	0.0
O	OPTICAL SCANNING	2- 8	2 1/8	0	0.0
O	PERIPHERONICS	1- 3	1 1/4	+ 1/8	+9.0
A	POTTER INSTRUMENT	1- 3	1 1/4	0	0.0
O	PRECISION INST.	1- 3	1 1/4	0	0.0
O	QUANTOR CORP	1- 2	1 1/4	0	0.0
O	RECOGNITION EQUIP	2- 5	4 1/2	- 1/4	-5.2
N	SANDERS ASSOCIATES	3- 6	4 1/2	+ 1/8	+2.7
O	SCAN DATA	1- 2	1 1/8	+ 1/8	+12.5
O	STORAGE TECHNOLOGY	1- 3	1 1/4	+ 1/8	+11.1
O	SYCOR INC	1- 13	7 3/4	- 1/2	-6.0
O	TALLY CORP	1- 4	2 1/4	+ 1/8	+5.8
O	TEC INC	1- 7	3 1/4	+ 1/4	+8.3
N	TEKTRONIX INC	18- 48	28 1/2	+3 1/2	+14.0
O	TELEX	1- 4	2 1/4	0	0.0
O	VARROC INC	1- 13	4 6/8	- 1/4	-4.1
O	VILTEC INC	1- 1	1/4	+ 1/4	+50.0
	SUPPLIES & ACCESSORIES				
O	BALTIMORE SUB FORMS	4- 8	4 1/2	- 1/4	-5.2
A	BARRY WRIGHT	4- 7	5 1/8	+1	+24.3
O	CYBERNETICS INC	1- 4	1 1/4	0	0.0
A	DATA DOCUMENTS	23- 96	41 3/4	+2 1/4	+5.7
O	DUPLEX PRODUCTS INC	1- 4	1 1/4	+ 1/4	+13.6
N	ENNIS BUS. FORMS	6- 11	9	1/8	+1.3
O	GRAHAM MAGNETICS	1- 11	1 1/4	0	0.0
O	GRAPHIC CONTROLS	1- 2	1 1/2	+ 1/8	+9.0
N	IBM CORP	43- 70	49 5/8	+1 1/8	+2.3
O	MOORE CORP LTD	33- 57	47 3/4	+ 3/4	+1.5
O	NEWPORT COMP	10- 46	10 3/8	- 3/4	-6.7
N	REYNOLDS & REYNOLD	8- 26	17	+ 1/2	+3.7
O	STANDARD REGISTER	10- 18	15 1/4	+ 1/2	+3.3
O	TAB PRODUCTS CO	4- 11	8	+1	+14.2
N	UARCO	13- 23	19 1/2	+ 1/4	+1.2
O	VARIED GRAPHICS CORP	3- 4	4 1/4	+ 1/4	+6.2
A	VARIAN MAGNETICS	3- 7	4 1/4	+ 1/4	+6.2
N	WALLACE BUS FORMS	14- 24	18 3/4	+ 3/8	+2.0

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